

RELATIONSHIP OF JOB ANALYSIS AND  
POSITION CLASSIFICATION TO PUBLIC  
AND PRIVATE PERSONNEL ADMINISTRATION  
RATNER

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RELATIONSHIP OF JOB ANALYSIS AND POSITION  
CLASSIFICATION TO PUBLIC AND PRIVATE  
PERSONNEL ADMINISTRATION

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CHAPTER I  
INTRODUCTION



Today position classification and job analysis have probably assumed more importance in government and industry than at any time in our history. This is due to such factors as the post-war industrial and business boom which has focused national attention on jobs and job rates; to the huge public and private job rehabilitation program, which places able and disabled war veterans in useful jobs; and to the programs of state and federal governments of tightening their works and assuming more active and efficient control over the selection and transfer of civil service personnel. ✓

This thesis was undertaken to summarize the significance and application of job analysis and position classification in public and private personnel management.

Since job analysis and position classification have been developed almost coincidentally by industry and by government for the same general purpose, it was felt particularly important to examine their relationship.

The chapters which follow attempt to define the various types of job analysis or position classification currently in use, and the present status of such activity; and to discuss the major possible applications of job analysis and position classification for the benefit of the employee and of management.



(3)

## CHAPTER II

WHAT JOB ANALYSIS IS



UNIVERSAL INTEREST IN JOB ANALYSIS

Nearly all of us have some degree of interest in jobs and job information.

Whatever other decisions we may avoid making in life there are few of us who are not faced with the choice of an occupation. The need applies alike to rich and poor, to the gifted and the deficient, the college graduate as well as the unskilled laborer. Frequently, the choice must be made not only once but several times. An ill-chosen occupation, change in health, the invention of an automatic washing machine, may make necessary repeated adjustments when it was presumed that a permanent life occupation or career had been chosen.(1)

This interest is primarily manifested by those planning to enter the world of work. Deciding upon the most suitable job, from the standpoint of aptitude and interest, and selecting from the bewildering number of complex private and public organizational structures is, of course, more difficult today than ever before. Sometimes for a youth without outside aid, the task seems almost hopeless.

An equally difficult task arising coincident with the problem of choosing a vocation is that of selecting needed training. A youth's first brush with specialized training reveals a bewildering world of hundreds of courses offered in colleges, universities, vocational, trade, correspondence, and commercial schools. To many of the thousands of students who leave school prior to completing high school or the lower grades, the problem persists.

(1) BIRKENBERRY, D. H. (ed.) An Introduction to Guidance:  
The F. J. Hear Company, Columbus, Ohio, 1930, p. 161



(5)

After acquiring a job, the incumbent's interest in specific matters pertaining to that job usually deepens. He becomes concerned with securing a fair pay for his work; with consideration for promotion for good work; with the tasks required in, and training for, each of a chain of jobs that make up a career in the particular field of work in which he is employed.

Interests in jobs are shared in whole or in part by the hundreds of thousands of workers, or potential workers throughout the country in the fields of business, industry, education, government, and labor. These interests, obviously, are not restricted to line employees, but are as important to a first line supervisor, and his supervisor, and the executives of an organization. Again, they are not restricted to the workers, but necessarily become the concern of what is known as management. This is partly because generally the problems of workers must necessarily become the problems of good management, and more specifically because job studies often aid in attaining more efficient production.

#### DEFINITIONS

JOB ANALYSIS: The interest in job and related information has led to the development of job analysis. As referred to in this study, this is fundamentally the process of determining (by direct observation, or next best, by questionnaire)



the detailed duties, skills, working conditions, and physical requirements of a job, and the description of such in terms understandable to the average reader. (See Fig. 1. for a sample job description used in industry.)

The definition of job analysis used herein is reduced to fundamentals, and so is a synthesis of a great many formal definitions by prominent authorities in the public and private personnel field. The large number of existing definitions is accounted for by the fact that there are many applications of job analysis, as discussed in Chapter IV. Most terms are in terms of single application. For example, Balderston<sup>(2)</sup> and Scott<sup>(3)</sup> define job analysis in terms of its application to wage and salary evaluation. Viteles<sup>(4)</sup> and Hunt<sup>(5)</sup> on the other hand, define it in terms of its use in determining the content of psychological tests and measurements.

(2) BALDERSTON, C. Canby, Wage Setting Based on Job Analysis and Evaluation, Industrial Relations Councilors, Inc., New York, 1940, p. 4.

(3) SCOTT, W. D., et al, Personnel Management, McGraw-Hill Co., New York, 1941, p. 238.

(4) VITELIS, Morris S., Vocational Psychology, Chap. XVIII, Fields of Psychology, J. P. Gilford (ed.), D. Van Nostrand Co., 1940, p. 443.

(5) HUNT, Thomas, Measurement in Psychology, Prentice Hall, Inc., New York, 1938, p. 276.



(7)

(6)

(7)

Hoover and Kingsley and Farnch define it in terms of its use in position classification and related civil service functions.

Other terms employed in conjunction with job analysis are: Job Description or Specification.

Some writers distinguish between the job description and the job specification. Where this distinction is made, the latter term refers to a condensed form, which stresses the qualifications necessary for satisfactory performance of the job, such as education, previous experience, physical abilities, plus any specialized capabilities.(8)

---written description of the essential features and requirements for each job. Job Standardization: "Establishing standard procedures for each job with standard titles." (9)

#### RELATIONSHIP CLASSIFICATION TO JOB ANALYSIS

What is the relationship of position classification to job analysis? The two terms have been so exclusively applied by different organizations to describe their separate activities, that it is often felt that they refer

(6) MOORE, W. E., KINGSLEY, J. Donald, Public Personnel Administration, Harper & Bros., New York and London, 1936-41, pp. 400-1.

(7) FARNCH, Isaac, "Basic Aspects of Position Classification" Readings in Public Personnel Administration, Washington, D. C., Civil Service Assembly of United States and Canada, 1942, p. 34.

(8) HALL, Frank, Controversial Issues in Salary Determination Massachusetts Institute of Technology, Boston, 1943, p. 1

(9) United Electric Radio and Machine Workers of America, The U. E. Guide to Fair Labor Practices, Wage Study and Job Analysis, No Address, United Electric Radio and Machine Workers of America, 1943, p. 36.



to widely different functions. Actually, they involve essentially the same procedure, techniques, and objectives. The only real distinction between them is that position classification applies to the process of analyzing and reporting jobs in the government, while job analysis is a term applied generally to the same activity in business and industry. Selected definitions illustrate how closely the one activity parallels the other.

**Private personnel administration:**

Job analysis is a determination of the essential factors in a specific kind of work and of the qualifications of a worker necessary for its component performance. (10)

**Public personnel administration:**

Reduced to its simplest terms, classification of positions is the process of finding out, by examining the facts and analyzing them, what different kinds of classes of positions, calling for different treatment in personnel processes, there are in the service; ...the duties and responsibilities of the positions are the basis upon which classes are determined and the individual positions assigned or "allocated" to their appropriate classes. (11)

The two terms 'position' and 'job' also are used exclusively by government and private industry respectively. However, they, too, are synonymous, as illustrated below:

**Public personnel administration:**

A position is a group of correct duties and responsibilities, assigned or delegated by competent

(10) ALPHEUS, L. F. and HARRIS, John H. (eds.) Production Handbook, Ronald Press Co., New York, 1945, p. 464.

(11) HARRISON, Louis, (chairman), Position Classification in the Public Service, Civil Service Assembly of the United States and Canada, Chicago, 1942, p. 3.

authority, requiring the full-time or part-time employment of one person. (12)

**Private personnel administration:**

A job may be defined as a group of duties and/or operations normally assigned to an individual, or, if reasonably alike in difficulty, importance and conditions, to a group of individuals. (13)

Therefore, we see that job analysis in the private field, and position classification in government service, are basically the same, differing only in details.

Position classification, it is true, probably has produced a preponderance of descriptions of "mental" or "white collar" jobs, and relatively few "shop" or "blue collar" job descriptions, while job analysis has probably produced a greater amount of the latter. However, the difference is really one of quantity, for to state that industrial job analysis cover "blue collar" jobs and that governmental position classifications do not is incorrect, as exemplified by the hundreds of position classifications prepared for federal agencies and smaller plants having shop jobs. On the other hand, to state that industrial job analysis programs do not cover "white collar" jobs is equally untrue, as illustrated by the many clerical, administrative, and technical jobs analyzed by such organi-

(12) HANSON, Ibid., p. 36.

(13) WALTON, R. P., "Job analysis, Description and Classification", Personnel Journal, (May 1946), Vol. 25, No. 1, p. 20.



gations as Western Electric Corporation, Southern California Aircraft Institute, and the Carnegie-Illinois Steel Company.

### THIRD TYPE TYPE OF JOB ANALYSIS PROCEDURE

Although job analysis is used to some extent in almost every large organization, it is most extensively employed by the following:

#### Governmental Civil Service

This first type is carried on by federal, state, and local governments, to describe the positions existing in their respective jurisdictions. The analyses are usually made by classification analysts employed by a centralized or decentralized personnel agency within the jurisdiction. Job information is commonly secured by direct audit of work activities, and by job questionnaires filled in by the worker, his superior, or both. Within the past few years the United States Civil Service Commission has embarked upon a program of extensive cooperation with state and municipal agencies for the purpose of coordinating job specifications among the various agencies. (14)

Written description resulting from the analyses are used as a basis upon which classes are determined. Positions are allocated to classes. As stated by Mowbray:

---when every position has been allocated to its appropriate class, each class will consist of all positions, regardless of departmental location, that are sufficiently alike in duties and responsibilities to be called by the same descriptive title, to be accorded the same pay scale under like conditions, and to require

(14) MOWBRAY, and KINGSLEY, op. cit., p. 36.



substantially the same qualifications on the part of incumbents. (15)

The Civil Service Assembly of the United States and Canada summarizes the following uses of position classification in the public service:

By emphasizing an impartial scientific approach, it helps avoid a purely personalized treatment of work and pay problems. It aids recruiting and testing authorities by making it possible to hold tests for classes of positions instead of a larger number of tests for individual positions having immaterial differences and by furnishing for each class a picture of the work to be performed and a statement of qualification requirements.

In its use as a sound basis for a fairly administered pay plan, it serves the interest of the people, the taxpayers, the operating officials, and the employees. Its system of class titles constitutes a uniform job language defined in class specifications, which, in itself, provides a basis for common understanding among all those agencies and officials having to do with personnel administration. It facilitates the preparation of informative budgets for personnel services; clarifies promotion and transfer transactions; aids in developing service rating plans and training programs; aids in planning, clarifying and improving organization; facilitates the development of good employee management relations; and makes it possible to keep significant service records and compile meaningful personnel statistics.

In these and many other ways, it serves as a facilitating instrument for personnel management and administrative operation, and as a specific tool for conducting many types of transactions involving the public, present and prospective employees, operating officials, accounting, budgeting

(15) HANCOCK, op. cit., p. 3.



and appropriating agencies, and the personnel agency of the jurisdiction. (16)

### The Public Employment Service

A second type of major job analysis program is conducted by Federal and state governments to analyze and describe the jobs that exist in business and industry. Such analyses serve primarily as an aid in the placement of the unemployed in jobs for which they are best suited by skill and temperament, in order to accomplish a broad objective of stabilizing employment throughout the United States.

These analyses are made by job analysts employed by the local state employment services (each state administers its own employment service). Analyses are also made by job analysts employed by the parent organization, who coordinate the work done by the state services and prepare composite occupational information that will generally be applicable throughout the nation. An example of this is the Dictionary of Occupational Titles, containing definitions and classifications for over 30,000 jobs existing in this country. This dictionary is used by all public employment offices in the classification and referral of individuals to jobs.

All of these analyses are made by direct observation of jobs and processes in business and industry throughout the country. The resultant occupational information pre-



pared is used as an aid in accomplishing the following objectives:

To bring workers to jobs for which they are best qualified, eliminating the economic and social wastes of misfit hiring and needless migration of labor.

In times of urgent labor demand, as for war production, to provide information which can be used to establish suitable worker training or re-training programs in cooperation with governmental agencies concerned with the vocational education of workers.

To provide information and advice to citizens concerning the nature of occupations and the requirements of jobs. This type of information is particularly useful to those with limited work experience, and to those workers who need to change their vocations because of physical disabilities or technological developments which render many types of work obsolete. For example, in post-war periods, there are usually large numbers of persons who become physically and vocationally disabled, but who must remain in the labor market. The employment service cooperates with veterans' organizations closely and with the division of Vocational Rehabilitation to develop programs that will bring such workers in contact with suitable employment.

To provide valuable advisory services to employers concerning their industrial engineering, or the organization of jobs and flow of production in their plants. Especially in times of gigantic production needs, as during war periods, to assist employers in determining their labor requirements on a scientific basis, and provide solutions to the problems of labor supply, either by discovering unexpected sources of workers, undiscovered skills in workers from less essential occupations or even in the same occupations, and by advising on the methods of lowering occupational requirements that were found to be too high.

To maintain current files of statistical information concerning the supply and demand of labor, to assist in national planning. In periods of economic depressions, to assist in planning for the required type and location of public works.



program, as well as setting up machinery for the selection and placement of labor on a nationwide basis.

#### Business and Industry

A third type of program is conducted by private business and industrial organizations to determine and record the content of jobs within their offices or shops. This activity is usually administered by the personnel department, though sometimes it is found in engineering, production, and even accounting departments. Job information is usually secured by direct observation of work by Job Analysts and/or by the distribution of questionnaires to workers and their supervisors.

Occasionally employee unions cooperate, to some extent or other, with the job analysts in the study and descriptions of jobs. As a matter of fact, the extent to which employee unions will participate in the company job analysis program is commonly a controversial issue during negotiations of a company-union labor contract, as will be discussed later in this report in the section on labor relations. This situation is true generally when the job analyses will be used as a basis for establishing wages and salaries, an activity in which employee unions are particularly anxious to be represented. Berge lists the following industrial objectives of the job analyst.

1. Job grading and classification.
2. Wage setting and standardization.



3. Provisions of hiring specifications.
4. Clarification of job duties and responsibilities.
5. Transfers and promotions.
6. Adjustment of grievances.
7. Establishment of a common understanding between various levels of management.
8. Defining and outlining promotional steps.
9. Investigating accidents.
10. Indicating faulty work procedures or duplication of effort.
11. Maintaining, operating and adjusting machinery.
12. Time and motion study.
13. Defining limits of authority.
14. Indicating causes of individual merit.
15. Indicating causes of personal failure.
16. Education and training.
17. Facilitating job placement.
18. Studies of health and fatigue.
19. Scientific guidance.
20. Determining jobs suitable for occupational therapy. (17)

#### OTHER TYPES OF JOB ANALYSIS PROGRAMS

There are many other organizations which have a formal or informal job analysis program. For example, many private management consulting firms and trade organizations employ this technique. Private consulting firms, such as the National Retail Trades Association, provide, for a fee, the services of job analysts who prepare job descriptions for contracting firms. Usually such job analyses are for the purpose of job evaluation, but may also be employed for such other purposes as the development of recruitment and transfer programs.

Many business and industrial trade associations, supported by dues from member firms, such as the National

(17) LIPPES, J. B., "Job Analysis: A Review and Bibliography", Journal of Applied Psychology, (June, 1943) Vol. 21, No. 3, p. 249.



Association of Manufacturers, the Manufacturing Chemists Association of the United States, and the Cleaning and Dyeing Institute, also frequently arrange for job analyses of the industry or business they represent. These job analyses are most commonly made for such purposes as comparing wage rates for jobs throughout the industry, and comparing hiring requirements of member plants. The analyses are usually made by a committee comprised of members selected from representative firms.

Finally, job analyses have been made, and are presently being maintained by the Army, Navy, Marine Corps, and other branches of the Armed Forces. These analyses are for the purpose of defining the duties, responsibilities, and other requirements of jobs held by enlisted and officer personnel. For example, it is the policy of the Army to classify--

---both the man and the job in its effort to fit one to the other. The Occupational Analysis Sub-section of the Personnel Research section has analyzed military jobs in an Army Regulation which is used to classify officers and enlisted men who assist them. The Regulation, AR 615-26, "enlisted men, Index and Specifications for Occupational Specialists" contains numerical and alphabetical listings of civilian occupations most useful to the Army, a general index of civilian occupations, job family groups of the occupations listed, and specifications for civilian and military occupational specialists.(12)

(12) Personnel Research Section, Adjutant General's Department, U. S. Army "Personnel Research in the Army", Personnel Journal, (April, 1943), Vol. 21, No. 10, p. 553.



While, of course, many of the jobs described are tactical in nature, the majority are quite similar to those found in business and industry. Included are such widely different occupations as File Clerk, Blacksmith, and Dentist.

To reciprocate, job analyses, for the many purposes described, above all have a great deal in common. This is particularly true of the major types discussed. They have essentially the same basic purpose, involve generally the same manner of securing job data, and, of course, are similar with respect to scope of jobs covered. The basic steps in any job analysis then may be summarized as follows:

1. Analyze the jobs: By direct observation of the work or through questionnaires filled in by the employees and/or their supervisors, or through interviews with the latter workers. This is accomplished by critical analysis and selective synthesis of such matters as duties, responsibilities, and working conditions of the job.
2. Prepare job descriptions: By recording the findings in a clear and concise manner.
3. Sort the jobs into classes: Each class should include all jobs, and only those, which are identical characteristics, such as level of responsibility and degree of skill.

#### REQUIREMENTS FOR A JOB ANALYST

Probably an introduction to job analysis would be incomplete without a summary of the qualifications required for its accomplishment.

The position of job analyst calls for broad

qualifications. A personality which commands respect is a primary requisite, since it is necessary for the job analyst to win the confidence of department heads and employees with whom he comes in contact. Skill and tact in approaching and handling people are thus essential. Indeed, the job analyst must be somewhat of a diplomat, maintaining a friendly attitude towards heads of departments and workers alike, and avoiding the development of antagonism and suspicion. The work of job analysis is slow and tedious, and the results are usually frequently tardy in developing. Consequently, patience is required to prevent premature discouragement. An analytical mind, impartial of judgement, keen powers of observation, thoroughness, and common sense are necessary. In addition to these characteristics, the job-study man will find considerable education, technical training, and experience indispensable to success. (19)

#### PRESENT STATUS

Job analysis is now generally recognized as an integral part of personnel management in both the government and private industry. In the latter, its importance has long been acknowledged.

The packers, the steel interests, the machine trades, are already adapting this new development to their several needs. In fact, the process of centralization of employment... and the necessity of placing responsibility for personnel on the shoulders of one man, has made the complete analysis and specifications of jobs a necessity. (20)

Some indication of the present scope of job analysis in industry is indicated by a study covering 2,412 companies.

(19) WATKINS, W. E. & LADD, F. A., The Management of Labor Relations, McGraw-Hill Co., New York & London, 1933, p. 140.

(20) CAMPBELL, D. & BLANCHFIELD, R., Problems in Personnel Management, W. W. Wilson Co., New York, 1943, p. 75.



This showed that job analysis studies were being conducted by 424 companies for 2,111,645 employees, and salary classification plans were being administered by 345 companies for 1,120,311 employees. It has been said that--

Undoubtedly, one of the most important developments to come out of management's current preoccupation with labor problems is the new emphasis placed today upon job classification and rating, and merit rating. The principle, of course, is not new; it is the organized, scientific application of it that is of present significance. It is discussed at practically every meeting of production or personnel executives, and the impressive work in developing methods of applying it in wage administration in specific industries is being done by trade associations. (21)

Today in the Federal Government, position classification is generally recognized as having fulfilled the promises forecast at its inception in the Classification Act of 1923.

This act, designed to classify positions according to their duties and responsibilities, so that like positions could be given like treatment as regards pay, nomenclature, recruitment and selection criteria, etc., while not considered as a boon to humanity by many present day operating officials, was greeted by those who had attempted to do a job prior to 1923, as a solution to their most pressing administrative problems. (22)

As with most progressive tools of management, experience has, of course, revealed many problems connected with the administration of job analysis programs. For example,

(21) National Industrial Conference Board, Inc., Job Evaluation Studies in Personnel Policy, No. 25, New York, National Industrial Conference Board, Inc., 1946, p. 123.

(22) Ibid., p. 25.

Frequently inadequate support is received from top management. This situation has encouraged many evils, including a free reign for unscrupulous supervisors who insist upon misrepresentation of the content of the jobs in their jurisdiction. The reasons for this, of course, arise from personal motives, such as, increasing the salary of favorite subordinates, and increasing their own organizational status. Needless to say, the job descriptions incidentally where such situations exist are quite unreliable and deleterious to the organization.

Other problems arise from a failure of organizations to maintain their job descriptions. Jobs in government and industry are constantly undergoing changes as a result of such factors as revisions in procedure in process, re-allocation of scope of duties, and different abilities of new incumbents. Obviously, the installation of a job analysis plan, no matter how efficient otherwise, which does not provide for a periodic audit and review of jobs is quite short-lived, and the product can be expected to become only more obsolete and misleading as time goes on. The Civil Service Assembly of the United States and Canada anticipated the problem--

---that unless material changes in organization structure and in individual positions, as they occur, are recognized in the current allocation of positions to classes and in necessary amendments of the classification plan itself, eventually the main features of the plan will be its obsolescence, its failure to fit positions in the service as they actually exist, and its consequent lack of utility in salary standardization,



recruiting, and other personnel functions.(23)

There is at present still room for considerable improvement in the actual procedures and techniques of job analysis. One of the greatest needs is for creation of procedures for better analyzing and recording the skills required by jobs. Anne Beranson, Director of the Industrial Research Department of the University of Pennsylvania, stresses this point.

Considering the glibness with which workmen are pigeonholed as 'skilled', 'semi-skilled', and 'laborers' in many industries, it is surprising to find little definition of what constitutes skill or lack of skill. ...a long list of exceedingly complex factors are covered up by lack of analysis of the term. ...perhaps the most difficult phase of skill to comprehend is the knowledge and ability necessary, not only to judge effects, after they have been produced, but to fore-know them.

Frank J. Beevor gives an illustration of this kind in the clothing industry.

In hand pressing the operative must be able not only to recognize the quality or the effect he has produced, but to pre-judge this effect on each kind and texture of cloth, thereby, know how to treat it.

Attention has already been directed to the fact that one of the intangible elements of skill is experience in judging the effect of a process and in varying it to meet the factors that cannot be controlled. This conclusion involves a new approach to the question of job descriptions.(24)

(23) BARUCH, op. cit., p. 287

(24) BERANSON, Anne, Skill, Industrial Relations Section, California Institute of Technology, Pasadena, California, January, 1946, p. 48.





CHAPTER III

JES. ABRAHAM AND THE REPLYER

Job analysis is admittedly primarily designed to aid in the solution of pressing administrative problems. What, however, are its advantages from the standpoint of the employee? Many of the latter feel, in the absence of information to the contrary, that the benefits are entirely one-sided and that this activity actually operates to the detriment of the workman. Such an attitude, obviously, would account for the initial failure, or at least, poor beginning of many job analysis programs.

Therefore, any job analysis plan that does not recognize the important role played by the employee is shortsighted and indeed, thoughtlessly devised. A successful plan will include 1) a recognition of the very considerable contribution that a properly informed and 'sold' employee can make to the job analysis, especially in terms of his job knowledge and cooperation, and 2) a careful consideration of the many advantages it offers to the employees, and provision for so notifying them.

#### Employee Contribution

In the collection of job information, there is no better source than the worker himself. As a matter of fact,

Everybody, even the most humble subforeman, straw-boss, or workman, who can furnish required information and throw necessary light on some subject, must be considered a counselor for that purpose. It must be remembered that one person can impart to another in a few minutes knowledge



which he has himself spent ten years in learning.(1)

Of course, the tendency of workers to shirk duties and responsibilities must be recognized and allowed for. The important point is that here is the best source of information for the analysis, if skillfully and tactfully analyzed.

#### Explaining the Plan

An informed employee typically views a study of his job with distrust.

Suspicion will be at once aroused if (the employees) are not taken honestly and completely into the management's confidence from the start. This can be naturally and helpfully done only in a meeting with those at the job, at which the whole implication of job analysis is made clear to them.(2)

Where such action is not taken, it is not unreasonable for such deleterious effects as loss of production through fear, resentment, or other morale-lowering factors to take place.

However, an explanation of the plan to employees in such a way as to get their best support requires considerable diplomacy and tact.

It is usually not difficult to convince the department heads of the value of the analysis to the company, to employees, and to themselves.

(1) Lippitt, R. W., Development Methods, The Ronald Press, New York, 1920, p. 65.

(2) TRAP, CHERRY, and MURKINS, H. C., Personnel Administration, McGraw-Hill Company, New York, 1925, p. 257.

They are in an excellent position to appreciate the need of a definite plan of operation, founded on exact knowledge. Unfortunately, as a rule, the employees themselves have neither the business experience nor the point of view to guide them in their reaction to the plan. It is necessary to present the idea to employees in a manner which will prevent their suspicions and fears concerning the purpose of the work and its result to their interests. An adequate explanation should be given before the collection of data is begun. While this may either be written or oral, depending on conditions, it should present the matter frankly and honestly. It should be pointed out that the purpose of the analysis is not the judging of personal merit, but is rather an attempt to gather information about the job itself to assist in the work of organizing, and which should result in better understanding and more intimate contact between the supervision and the employees on the work.(2)

#### Some Causes of Employee Unrest

Our newspapers are constantly bringing us reports of disputes between labor and management. What are the causes of these differences? Demands for better pay, usually, make the headlines. Actually, there are nearly always a great many other points in dispute, few of which make their way into large print. Often, complaints about conditions completely unrelated to pay, plant the seeds of unrest that finally grow into decisions to strike. Studies of employee attitudes have indicated that, although important, the general level of salaries is less effective as a determinant of general morale than a number of other factors.

(2) GULBRIDGE, H. E. and MILLER, J. W., Personnel and Business Administration, Ronald Press Co., New York, 1927, p. 86.



The results of one survey revealed the following items of most importance to employees:

1. Lack of appreciation of one's work and of one's individuality.
2. Lack of recognition.
3. Unfairness in matters of pay, time off, special privileges, vacations, and the like, between individuals or departments.
4. Poor leadership and supervision by one's superior.
5. Indefinite job duties and incomplete instructions.
6. Lack of knowledge of how one stands with the company.
7. Excessive discipline and lack of uniformity in disciplinary measures.
8. Lack of uniformity in employee benefits.(4)

#### Advantages of Job Analysis

The establishment of official descriptions of jobs as a guide for supervisors and employees alike is advantageous to the latter in many ways. The most important benefits are summarized below--

#### A 'fair day's pay for a fair day's work'

Quite frequently employee complaints regarding pay arise from the discovery that fellow employees, doing comparable work, are getting higher salaries. In such instances, the supervisor may be quite innocent of discrimination, where there is no job analysis. For:

It is almost impossible to consider a job apart from its present incumbent, unless a job description is used. Furthermore, there is grave

(4) LIPPIN, Harold, Salaries, Wages and Labor Relations, The Ronald Press, New York, 1937, p. 8.

danger of overlooking some phase of the job in any abstract consideration of it. (5)

Since job descriptions are for the purpose of providing an unbiased record of the duties and responsibilities required, they furnish the only fair and impartial basis for the establishment of pay rates.

Therefore, the importance of job analysis as a factor in maintaining good employee morale is widely recognized.

The effects of...inconsistencies in wage rates upon the personnel are far-reaching. There is an undercurrent of dissatisfaction which encourages numerous requests for interdepartmental transfers, and if transfer is denied, competent workers frequently go 'shopping for jobs' in other plants. Even if they remain with the company, there is no incentive to efficient service and the tendency is to withhold their best efforts. By providing specifications which form the basis for equalization of wage rates, job analysis eliminates this prolific source of discord and tends toward stabilization of the working force. (6)

#### Indefinite Duties and Responsibilities

We often hear our employees complain that their duties and authority for action are ill-defined. Probably one of the most common employee grievances in industry and government is "responsibility without authority". Sometimes these complaints are justified through deliberate acts and assignments of petty and unscrupulous supervisors. The

(5) HALL, op. cit., p. 10.

(6) WATKINS & DODD, op. cit., p. 126



assignment of tasks without authority results then to accept full credit for successful results. Possibly more frequently, such conditions are the results of carelessness, over-sight, and similar factors, merely the result of poor management. Whatever the causes, the results are, of course, deleterious, both to employee and management. Studies have shown that mental attitudes engendered--such as fatality, discontent, and lassitude--often produce more fatigue than the actual work duties themselves.

What is the responsibility of management in this respect?

It is the basic right of every member of a business organization to know what his job is. Then he can visualize this job, know how big it is, realize just what he has to do, and set a goal for himself. ...It is one of the most important responsibilities of management or an organization to define in complete detail the duties of every member of that organization so that the division of labor, or the breakdown of responsibility, is understood by all. Complete specifications for every type of job in a given industry, from the lowest level to the highest, should be set up. The summing up of all these specifications shows a total that defines the accomplishment of the whole organization.(7)

#### Recognition and Appreciation of Work Done

Recognition of work performed is one of the most powerful stimulants to employees. Many plans have been devised throughout industry and government to analyze worker performance and advise incumbents of their strong and weak points. These variously titled performance, service, or

(7) Lums, Robert E., Personnel Management, Alexander Hamilton Institute, Inc., New York, 1941, p. 11.

merit rating plans are all based on a common premise-- that the worker clearly understands what duties and responsibilities are expected of him. This frequently is an erroneous assumption, for many supervisors rate their employees on the basis of duties for which the extent of accountability is clear to neither themselves nor the workers. However, there will be no misplacement of blame if each worker is familiarized with the scope and with the details of his duties.

#### Fairness in Promotion

All employees should be extended the benefits of a clearly defined and fairly administered promotional program. To carry out such a program requires not only job descriptions but a careful determination and delineation, from the job data gathered, of the interrelationships of all positions within the organizations.

Thus we see that to get at the root of most major problems troubling employees, we are invariably led back to a common starting point--the careful and comprehensive analysis of their jobs.



CHAPTER IV

RELATIONSHIP TO PERSONNEL MANAGEMENT

### Keystone of Personnel Management

The careful analysis and description of jobs enhances the efficiency and effectiveness of the whole organization. Since this activity is concerned with the fundamental units of any organization, the worker and the job, it might be said to be the very keystone of personnel management. It, necessarily, touches a great many of the functions of personnel administration.

### Time and Motion Study

Chronologically, job analysis originated outside of what is now the personnel department of an organization. It had its inception in time and motion study, frequently referred to, as methods analysis, and now principally a tool of industrial engineering. Time and motion studies were introduced in 1881 by Frederick W. Taylor at the Midvale Steel Company, and have developed into a highly specialized technique for analyzing methods in mechanical pursuits where the operations are specialized, repetitive, and more or less the same from day to day.

This type of analysis involves the study, timing by stop-watch, and recording of each physical movement made by the worker on the job. Its purpose is to serve as a basis for the determination of the one best way of performing a job. However, it has proven unjustifiably tedious for most personnel administration purposes and so is little used for job analysis today.



The relationship of job analysis and time and motion study, therefore, has been restricted to such uses of the analysis in industry as 1) a basis for subsequent supplementary time and motion studies. (In this respect, the job descriptions serve as an outline of the organization and detailed definition of the scope of the organizational units or jobs.) 2) a basis for reevaluating jobs changed in duties and responsibilities as a result of methods improvement. Changes so made frequently affect the value of the jobs in terms of wages or salaries. This can only be ascertained by a careful job analysis and subsequent application of job evaluation standards.(1)

The federal Government has generally prohibited time and motion studies of its jobs, as this type of activity met considerable resistance from its craft unions. (2) Thus, of course, the relationship between this activity and job analysis exists only in business and industry.

#### Job Evaluation

Job analysis has already been defined as the determination and recording of the detailed duties, skills, working conditions, and physical requirements of a job or position. Job evaluation is best defined as

The extension of job analysis to ascertain reliably the relative worth of jobs, to transform these appraisals into a structure of adequate rates, and to provide standard procedures for all additions to, and adjustments in, the rate structure.(3)

(1) FATHINE and BOUL, op. cit., p. 181

(2) LUTY, Lewis, Public Personnel Problems, Washington, D. C., Brookings Institute, 1934, p. 21.

(3) LUTY, Charles Walter, Job Evaluation Methods, The Ronald Press Company, 1946, p. 4.

Thus, in order to determine the worth of a job most scientifically, there should be two separate and distinct steps. First, an analysis of a job content should be made. Second, these data should then be converted, by application of a selected job evaluation plan, into a salary or wage, in terms of dollars and cents. It is felt justified in emphasizing the distinction between the two terms. Job analysis, involving the analysis and description of duties and responsibilities of jobs, is applicable to practically all personnel functions. Job evaluation applies only to the determination of wages and salaries of jobs.

Schappert, in an address, has stated:

The key to industrial efficiency is an income scale that reflects correctly the difference between skilled and unskilled work, between trained and untrained men. Incomes must be paid according to work done and not according to need. No, the author is not Horatio Alger, but Premier Stalin of Russia. Which is not to argue the merits of the Russian System, but rather to point out that here is a new, struggling, virile people acknowledging a truth that made us great.(4)

Historically, job evaluation originated about twenty-five years ago through application of principles of job analysis. Among earlier research workers was Dr. W. V. Ringler, head of the Bureau of Personnel Research at Carnegie Institute of Technology, who made extensive investigations

(4) <sup>H</sup> SCHAPPERT, Joseph, W., The Foreman's Job in Our Time, National Metal Trades Association, New York, 1947, p. 7.



of relative salaries in various industries shortly after the First World War. During that period, business and industry began to take an active interest in job analysis as one solution to the increasing problem of collective bargaining. The job analysis and job evaluation techniques subsequently developed provided the most scientific methods possible for establishing equitable and consistent wage and salary plans.

Job analysis is now recognized in both industry and government, as an essential pre-requisite to job evaluation. In addition, it provides a permanent record for justifying pay rates arrived at by job evaluation. During the Second World War, the Federal Government, faced with a critical problem of maintaining consistent wage rates throughout the country, made job analysis mandatory. Private employers of thirteen or more employees were required to have job descriptions for all jobs in their organizations, under General Order 11, issued by the War Labor Board. The order required such employers to submit, along with their request for approval of wage rates, "clearly defined and described job classifications."<sup>(5)</sup>

There are four principal methods of evaluating jobs--the ranking system, classification system, point system, and factor-comparison system. While all types are used in business and industry, only the first two, in general are

(5) LITTLE, *Ibid.*, p. 4.

applied by the Government in analyzing its jobs.

In the public service it is (generally) not the practice to analyze or evaluate positions by mathematically scoring selected work-factors of specified weights. Some private manufacturing and commercial concerns use this method. Others follow practices which are parallel to those in public jurisdictions. (8)

#### Recruitment

One of the most important benefits of a job analysis in personnel management is the establishment of definite job requirements for recruitment. It is only reasonable to secure comprehensive information concerning jobs before attempting to hire people to fill them.

Today employee selection is the function of a centralized personnel department in practically every large public and private organization. The development of this system started when large employers began to realize that among other things, the greatest labor problem confronting them was the proper selection and handling of the work force. Prior to that, the supervisor was recognized as the sole arbiter in determining whether an applicant was suitable.

The Navy Department Use for the Job Analysis Information. (See Fig. 2 for relationship.)

A glance at this chart may help clarify the relationship of naval job analysis to naval personnel administration.

(8) WALLACH, op. cit., p. 24.



A wheel has been selected to delineate this relationship. Job analysis is the hub, various elements of personnel administration as the rim.

This illustration was selected to explain graphically the relationship of job analysis to elements of personnel administration. All spokes are equi-distant from the hub and are equal to each other. It should be noted that job analysis has the same or equal relationship to selection, as to recruitment; to training as to promotion (advancement) and so forth. Similarly, good morale is as important to good personnel administration as good training.

At the present time, many supervisors still resent encroachment on this responsibility of hiring by a specialized personnel manager, on the basis that they are the best authorities on job requirements. Most authorities differ with this attitude on several counts. With respect to job analysis, they doubt the competence of foremen in general to analyze the job which they supervise.

The foreman, at best, selects a few men a day and has little time or capability to organize his methods. On the other hand, the employment manager who selects all the help, must necessarily have definite knowledge of the work for which they are chosen. Centralization of employment, in fact, gives the employment manager individually as much experience in hiring as all the foremen can gain collectively.(7)

Two fundamentals, of course, must be considered in the selection process--analysis of jobs, and analysis of applicants.

(7) HANCOCK AND HANCOCK, op. cit., pp. 76-77.

What is their relative importance? We can conclude only that they are equally indispensable, for both are ardently advocated in pertinent literature. Feeling arises on both sides when it is suspected one is being subordinated to the other. For example:

Meticulous attention devoted to the art of reviewing, extreme care exercised in the development of application blanks and other paraphernalia of hiring, and assiduous experimentation with various kinds of character analysis and intelligence tests, all suggest that "man analysis" rather than "job analysis" has consumed the energies of employment managers. Perhaps this is as it should be, but there is every reason to believe that human analysis has little value for the employment department except in relation to specific positions. The necessity of analyzing jobs, as well as men, is rapidly becoming apparent, and employment managers are beginning to invade production and operating departments in search of data relative to the jobs to which they are constantly expected to assign new workers. (8)

Certainly, it is clear that all errors in personnel selection cannot be blamed on the complexity of human nature and the difficulty of measuring human traits. First, a careful scrutiny should be made of the selection activity to be sure that it is known what is wanted. It should then be determined, if there are comprehensive job descriptions, they are used conscientiously.

Merit Rating (Performance rating, and service rating interchangeable terms).

Merit rating, because of inherent problems arising

(8) BATHURST and DODD, op. cit., p. 119.



principally from the need for elimination subjectivity in its application, has undergone in the last decade considerable research by private governmental organizations. Most of such efforts are concerned with devising better methods for measuring the job efficiency of the executives and subordinate employees. As a result, many plans now exist which if properly administered, serve reasonably well as a basis for predicting future success when considering promotions and transfers, for discovering employee weaknesses indicating further training, for serving as test criterion and for assigning increases within class ranges as an incentive for good work.

The concept of a class merit rating job analysis relationship is relatively new. However, it is inevitable that progressive organizations will ultimately recognize that a merit rating program, in order to be most effective, should be reinforced by complete job descriptions covering every increment. Supervisors are all too prone to allow job lines to blur and fuse when rating the performance of subordinates in various classifications. Consequently, employees who are the victims of such carelessness or ignorance may be rated on the basis of tasks and responsibilities either above or below the requirements of their classifications. It certainly would seem that if a worker is hired because he meets the requirements of a job description, he could subsequently be rated against the same specified duties

and responsibilities, or such portions of it as may be necessary.

Probably for the best results, the installation and application of a merit rating plan should follow the preparation of job descriptions covering all employees to be rated. Each merit rating should include a comparison of the performance exhibited by each employee during the applicable period, with the requirements for the job as contained in a job description for the employee's classification. For example, a record of an employee's performance during a rating period may include the fact that he failed to handle specifically mentioned statistical projects involving the use of calculus, and had to receive help each time. Reference to the job description for that employee might reveal that the job required only the solution of statistical problems involving given formulae, and not computation by means of calculus. In the latter case, the employee should not be rated, of course, on his performance of such tasks, since they were over and above the requirements of the job. A reverse situation might be equally common, where a supervisor might tend to rate an employee outstanding because of the repeated solution of complicated statistical problems, when the ability to perform such problems might actually be a minimum requirement of his job, and therefore, expected of an average worker with respect to that job.

The rating arrived at should be reviewed with the employee. An orderly procedure such as this, not only insures a maximum



of accuracy, but cannot fail to impress the employee who may believe his rating unnecessarily subjective. While a review of job descriptions at the time of each merit rating-period may seem unjustifiably tedious to supervisors, the time consumed is probably insignificant when compared with the importance of the product.

The actual construction of the merit rating scale used might well be based on the job analysis.

Since the service rating scale is to be used to measure job performance, a good first step in its construction is an examination of the job. If the job is analyzed into its component duties and responsibilities, the beginnings of the service rating scale will appear, for these job elements can be adapted to become the major items of the rating scale. At times, items pertaining to such personnel and social behavior as is deemed essential to the job, can also be included. When this is done, care should be taken to have the items reflect an observable fact rather than an abstract quality.(9)

#### Transfers and Promotions

Careful analysis of jobs and their relationships is essential to the satisfactory accomplishment of the transfer and promotion function. In any well organized and intelligently administered organization, we can expect employees frequently, to move from job to job within, or between, the various units, sections, and departments. Human nature is not such, that the employee can generally

(9) LICKS, Norman, "Employee Rating", Personnel Journal, Vol. 21, No. 2, (Feb., 1942), p. 133.

be placed on a job and, as in the case of a machine, be expected to function there until he is removed, because of old age. Job changes, inaugurated by both employees and supervisors, stem from innumerable causes, such as personality conflicts, inability to do work, and qualifications for more skilled activities. To carry out these changes effectively, we must be well informed about all jobs in the organization.

Curiously enough, there has been a lack of sound development of this function, both in industry and government. In spite of the frequent claim that "promotion from within" is the firm policy of various organizations, closer inspection reveals little preparation for accomplishing this highly desired objective.

Some wag has suggested that the expression 'you can't keep a good man down' was invented by those at the top to explain how they got there. Although most employers think that there are excellent opportunities for advancement in their respective organizations, studies of employee attitudes have disclosed much dissatisfaction with the ...promotional procedures. In business, as well as in other institutions, there is frequently a useful lag between executive intentions regarding promotions and actual practice. (10)

A workable transfer and promotion plan should include the following: 1) a comprehensive description of the duties and responsibilities of each job. 2) a determination and delineation of the relationships among all the jobs in an

(10) PARKER, C. B., "Developing Promotional Opportunities", Personnel, Vol. 15, No. 4, (May, 1939), p. 206.



organisation. 3) a plan for notifying employees of promotional opportunities. 4) a careful tying in of the program with related personnel functions such as job evaluation, merit rating, and promotion examinations.

First, it is essential that job descriptions be very complete and detailed with respect to duties, skills, and surrounding conditions.

A general plan of promotion which is not constructed on a foundation of specific and explicit specifications, is foredoomed to failure. Men cannot be advanced from position to position presenting a spiral of responsibilities unless the nature and requirements of higher positions are definitely known.<sup>(11)</sup>

Second, the relationships among all jobs in the organization should be carefully established. This assures not only a "correct time of advancement, but frequently makes possible an escape from 'blind alley' jobs by linking them up with positions in the same or different departments which offer greater opportunities."<sup>(12)</sup> The job relationships should be delineated in either tabular or chart form for use by employees and supervisors alike. (See Figure 3 for illustration.)

Probably the best means of establishing relationships between jobs is by application of the Job Family Plan,

(11) WATKINS and DODD, op. cit., p. 127.

(12) Ibid., p. 121.

originally developed by the Occupational Analysis Division of the United States Employment Service. Job Families are groupings of "occupations that are related because they involve similar work activities."<sup>(13)</sup> Any and all types of jobs, whether 'white collar' or 'blue collar' may be grouped, on the basis of duties, skills, and responsibilities required. For example, Figure 3 illustrates a job family plan developed by the author for shop jobs in an aircraft factory.

In the example, jobs were grouped on the basis of 1) work done, 2) tools, machines and other work aids used, and 3) materials used, also 4) significant physical demands required. The individual job then, with its definite pattern of required duties (by means of the Job Description), physical demands, special skills, machines or tools, forms the basis for the job family. For example, in Major Group 5, consisting of homogeneous grouping of jobs of the Tool and Die Maker, Jig Building Floor, and Bench Mechanic, Grade A were grouped together because they all involved in varying degrees, a knowledge of blueprint reading, or computation by shop mathematics, and of layout of metal parts from blueprints. Of course, some of these jobs required

(13) United States Employment Service Manual, Part III, Job Families, (Washington, D. C.: United States Employment Service), June 30, 1943, p. 2001.



a higher degree of skill than others. This is provided for by listing the jobs in the table in their increasing order of skill. Footland Die Maker, being the most skilled, heads the list. The relative skill is also indicated by Labor Grade, which is a term used to convey pay level of the job. Labor Grade 1 is the highest pay level; Labor Grade 10, the lowest.

The job family plan of establishing job relations offers many advantages. By grouping similar jobs in order of their increasing skill, it outlines a number of definite 'career' plans. Typically, workers would be hired for the lower skilled jobs in the groups from outside the organization. Promotions could then be made, in an orderly and systematic manner, by advancing qualified workers into the next higher jobs in their occupational group. The beginning worker, by referring to the job family, is enabled to see the 'career' possible for him, in whatever occupational group he chooses to enter. Furthermore, if job descriptions are available, he is enabled to see what training he will have to acquire in order to qualify for the higher jobs. If it is desired to allow employees to transfer between various groups in the job family, inter-group relationships may also be established.

The third step in the transfer plan, notification of employees of promotions, may be handled in a number of satisfactory ways. Following is a summary of a plan

employed by Carr, Adams, and Collier, Cash and Coor Manufacturing Company, Dubuque, Iowa.

1. When a vacancy occurs in a job, it is filled by employee, if qualified, in order of their seniority in the next lower skilled job in the job family. (Some jobs require passing a qualifying test.) Employees are considered for promotion in order of their seniority, and qualifying ones are so notified by their supervisor.
2. If no qualified employees are found in the job family in which the vacancy occurs, the job is advertised, through notices on bulletin boards, to incumbents of all job families, and the best applicant is selected if qualified.
3. If no qualified employees are found through advertisement, applicants are hired from the outside.

Finally, with respect to relating the transfer plan to other personnel functions, advantages are obvious. For example, merit ratings, tests, employees' work records, and safety and medical reports pertaining to the employee should all be considered in selecting employees for transfer.

#### Employee Training.

Job analysis offers the only sound basis for the training of employees, particularly if used in conjunction with the recruitment function, previously discussed in this report. The trend today is more and more towards tying together these two critical functions. Carefully prepared job descriptions provide new employees with information of exactly what management expects of them. Likewise, they provide supervisors with a standard definition of what to



expect of the employee.

Subsequently, the job descriptions may serve as a reference for preparation by the supervisor of a checklist of those aspects of the job in which the employee is weakest. This information, utilized by the supervisor, or by representatives of training departments, then becomes the basis for practical aid to-the-point training courses.(14)

Historically, employee training programs date back as far as industrial and governmental organizations. They were the closest calling points of the medieval guilds. They were present in the apprenticeship training program coordinated by the federal Government. The function of vocational training has been passed back and forth between the educational institutions and business and industrial institutions considerably during its long history. At one time there were vigorous public educational institutions who were quite willing to relieve industry and commerce of the entire problem of training for the job. It has been found, however, that the public schools have not sufficient facilities, in a great number of cases, to assume on-the-job training, and industry retains, therefore, a large portion of the educational responsibility.(15)

Today, an increasing number of public and private personnel departments include the function of employee training. In industry, for example, it is quite common to find a training director with his own separate staff. Activities usually include training workers as well as supervisors how to perform, or better perform, their jobs. This involves first, the classification of jobs; second, the preparation of instructional materials concerning employees'

(14) Personnel Research Fed., "Report from Three Companies", Personnel Journal, Vol. 19, No. 7, (Jan., 1941), p. 261.

(15) Encyclopedia Britannica, Vol. VIII and Vol. XIII, (Chicago: Encyclopedia Britannica, 1943), p. 412.

jobs. Third, it involves the teaching of employees either by a representative of the training section or a selected worker or supervisor. In the latter cases, of course, the employees must be instructed in the principles of teaching.

It is generally acknowledged that the preparation of the instructional material needed for training classes should be based on job analysis. Watkins and Dodd state:

It is difficult to conceive of a successful training program in the absence of detailed information relating to the various jobs in an establishment. Positions must be classified, indexed, defined, evaluated, and related, if a systematic program of employee training is to be maintained. Men cannot be prepared intelligently unless the nature, duties, and responsibilities of the jobs for which they are being trained are definitely described. The content of the training curriculum, length of the training period, and selection of candidates for training are alike dependent upon an adequate study of jobs.(16)

### Selection Tests

The essential character of job analysis in a program of vocational test construction is recognized by practically all authorities in the public and private fields. As expressed by Bingham:

It is a safe assumption that the accuracy and success of a study in vocational selection will be directly proportional to the completeness with which the foundation is built on the job analysis. In too many instances the psychologist has been content to construct tests and other measuring instruments after only a superficial observation of the work processes.(17)

(16) WATKINS and DODD, op. cit., p. 127.

(17) BINGHAM, Walter Van Dyke, and SMITH, Max, Procedures in Employment Psychology, (New York: McGraw-Hill Book Company, 1936), p. 13.



The evolution of our modern methods for selecting and transferring employees by practical tests of job knowledge, or aptitude for jobs, has been slow and painful. Frontiers of improvements in procedures and techniques have been accompanied by other problems arising from industrialism and improper use of tests devised. Also, particularly in industry, completely invalid competitive methods have had to be disapproved, such as phrenology, physiognomy, physiognomy. In fact, there is some conjecture as to how many employers, consciously or not, still subscribe to one or another of these beliefs.

Job analysis is the first step in any vocational testing program. This applies whether the test is designed to measure aptitude or achievement, since aptitude tests are for the purpose of measuring either present or future success on the job, and therefore, must be related to job duties. The relationship of job analysis to the complete process of test construction has been well described by Mosher and Kingsley.

Considered broadly, the principal steps involved in the examination process are six in number:

1. Job analysis to determine the abilities and capacities required for success in the position to be filled and the promotional hierarchy of which it is a part.
2. Determination of the types of evidence which can be adduced in respect to the presence or absence of these desired characteristics, and of the appropriate examining instruments for each.

3. The outline and preliminary preparation of the examination instruments.
4. The standardization and validation of the examinations to be employed.
5. Administration of the examinations. (18)
6. Evaluation of the test results.

Job analysis for test construction must be supplemented by other data not usually required in the other applications of job analysis. This might be distinguished as "psychological analysis" rather than 'job' or 'duties' analysis. It includes, in addition to the information on duties and responsibilities included in the usual job analysis,

....a carefully controlled concrete study of a considerable number of individual workers, to discover in which part-activities of the occupation the more efficient individuals are chiefly superior to the less efficient. (finally) ...the extensive study of those critical part-activities found to be significant. The purpose ...is to discover, what traits of intelligence, capacity, temperament, will, etc., combine to produce efficiency in these particular segments of the behavior under investigation. (19).

(See Fig. 4 for an example of a job analysis checklist for securing information for test construction.)

A notable example of proficiency tests based on extensive and comprehensive job analysis is that of the oral trade questions produced by the Occupational Analysis Section

(18) HOGAN & KINGSLEY, op. cit., p. 266.

(19) HILL, Clark, Attitude Testing, (Yonkers-on-Hudson, 1929), p. 206, quoted in Hogan, W. and Kingsley, J. C., Public Personnel Administration, New York and London: Harper and Brothers, 1936-1941.



of the United States Employment Service. The tests were developed for specific occupations, and each consists of sets of from ten to twenty questions. They were designed to be administered orally as an integral part of the recruitment process. Some examples of trade questions for the occupation of Airplane Mechanic follows:

1. What is the firing order of a Double Row Cyclone, 14 cylinder, Pratt and Whitney Engine?
2. What color C.A.A. Identification Band is used on a fuel line?

### Vocational Counseling

Job analysis has always been closely identified with vocational counseling. As a matter of fact, the first attempts at preparing vocational counseling materials resulted from early job analysis. For many years, investigators in vocational guidance, called 'vocational analysts', analyzed jobs into their component parts so as to provide bases on which individuals could choose vocations. Frederick J. Allen is widely known for his pioneer study of this nature. Called 'the machinist', it was made in 1910 for the Vocational Bureau of Boston, Massachusetts. Following this, there were a great many similar studies made throughout the country for numerous occupations.

In the development and maintenance of vocational counseling programs, it was necessary that job descriptions either be prepared by the counselor or secured from outside sources. The following viewpoints from various authorities illustrate

their unanimity in opinion with respect to this point:

That the vocational counselor needs to know something about occupations is as obvious as it is that a traffic policeman needs to know where the streets are.(20)

Vocational guidance which has for its purpose the vocational welfare of the individual is founded upon several principles, one of which is occupational information an individual may make an intelligent choice of the occupation in which he will be happy and through which he will be able to derive a considerable livelihood.(21)

The effectiveness of vocational counseling depends largely upon adequate tests, records, an occupational information. Without such aids, the teacher or counselor must feel his way without a solid foundation of trustworthy data on what to base his conclusions.(22)

Authorities differ as to whether the counselor should actually make the job analysis. Some advocate leaving this activity to specialists in job analysis, others feel it is necessary that the counselor engage in job analysis at least to the extent of becoming familiar with it.

For those without facilities to make job analysis, there are available a tremendous number of publications describing jobs and professions. Possibly the most comprehensive is the Dictionary of Occupational Titles prepared by the United States Employment Service. Typical

(20) FITCH, Jean A., Vocational Guidance in Action published for the American Association of Social Workers, (Columbia University Press, New York, 1935), p. 49.

(21) BAKENBERRY, D. H., op. cit., p. 47.

(22) SCHUBB, Otto, and FLEMMING, A. J., Guidance Plans and Methods, No. 8, (Chicago, Illinois, Science Research Association, 1941), p. 8.



Governmental organizations offering such material are the Bureau of Census, the United States Office of Education, and the Department of Labor.

#### Physical Demands Program

Vocational rehabilitation programs, involving among other things comprehensive job analysis of occupations suitable for handicapped employees, have been quite common since the beginning of the last war. Especially recently, such endeavors have been encouraged by educational, private, public, and labor organizations throughout the country.

In spite of widespread interest generated in this problem of the handicapped, by the Government and various social groups, physical demand programs are quite commonly ignored as a normal function of personnel management. Many organizations simply do not want to be bothered. Some dismiss the problem with a generalized excuse--for example, that they must maintain high medical requirements for entrance on the job. Others maintain that hiring physically defective individuals might result in financial loss to the organization through accidents and resultant higher insurance rates.

At the other extreme, and equally deleterious to the employee, are organizations who hire handicapped persons indiscriminately.

The customary reaction of the employment interviewer in many plants, when confronted with the physically handicapped individual, is usually to go over the available jobs in a not too scientific

manner, in an effort to determine whether the person could 'get by' on one of the jobs. Any success resulting from hiring methods of this kind is apt to be a matter of coincidence. There is too much chance in this situation that the individual will be placed on a job on which it is true that he can 'get by' but on which he can scarcely produce a really satisfactory amount of work. In addition, there is a possibility of endangering the safety record of a department by introducing workers in this manner.(23)

Adoption of a systematic and careful physical demands program has proved through increased production to be more than just a social service. This is illustrated by some firms who, from the sole standpoint of efficiency have made a practice of hiring physically handicapped persons exclusively for selected jobs. Blind persons, for example, have been placed on dictaphone typing jobs, and deaf persons on policy factory jobs. In such cases, and many others, production results frequently have been much greater due to inability of workers to be distracted by certain elements, and to the fact that persons handicapped by physical limitations tend to adjust to them and develop compensating physical abilities often resulting in above-average performance in other activities. A result of a survey of handicapped employees at the Consolidated Vultee Aircraft Corporation illustrates desirable results obtained:

(23) HARR, F. J., "Employing Physically Handicapped", Personnel Journal, Vol. 23, No. 4, (October, 1944), p. 131.



The importance of ... (physical demands) ... procedures becomes clear in the light of recent surveys on absenteeism and turnover. Our San Diego plant reports that preliminary studies made on over 1000 men and women at the plant having physical limitations, have shown that the absentee rate among these people is less than half of the average rate for the plant.

From a moral standpoint, tying in with the reducing turnover, the resultant benefits of the program are obvious. The individual feels that a conscientious attempt has been made to place him on a job which he can properly handle. As a result, he will make a stronger attempt to stay with the job assignment. (24)

A physical demands program consists essentially of the matching of workers with physical limitations with jobs which they are qualified to perform. It involves, 1) an analysis of jobs in an organization, with emphasis on their physical requirements, and 2) a plan for appraisal of the physical capacities of a worker.

First, the job analysis should include a very detailed report of the physical activities required of the worker, and of the working conditions under which the job must be performed. Second, with respect to an appraisal of the worker, this should be done at the initial interview preferably based on a medical examination. Subsequent changes in the physical conditions of the employee through age, accidents, or sickness should be recorded to facilitate his proper subsequent transfers and promotions.

In conclusion, the desirability of establishing a physical demands program within the personnel department seems quite justified. The job information developed for such a plan serves to, 1) facilitate the efficient operation of procedures for allocating new employees to jobs that they are physically qualified to handle, especially those workers who must be given special consideration because of physical limitations; 2) for transferring a worker from one job to another within the establishment whenever it has been found that he has been inaccurately placed before the program put into operation; and 3) for giving the best opportunities to workers injured on the job.

#### Labor Relations

A discussion of job analysis would be incomplete without relating it to labor relations--one of the most important management functions. At no time in our history has labor been so strong. Problems of the worker and his job have become not only of primary importance to private and governmental employees--they have been taken to the highest authorities in the United States--(Congress, the Supreme Court, and even the President.) There are many who think that industrial organizations, even with their specialized labor relations staff, are incapable of handling labor problems without Government help. Therefore, there is a consistent pressure to project the latter more and more into the picture.

Labor relations has been defined as including "those



problems that grow out of conflict of interests, either real or apparent, within the business organization."<sup>(25)</sup>

Therefore, the function of the labor relations section in the personnel department is primarily to integrate the interests of workers and management in such a way as to eliminate these conflicts as much as possible. This means that a primary objective is the promotion of good morale within the organizational structure, and elimination insofar as possible of the grievances of workers concerning their jobs.

What is the relationship of job analysis to labor relations and the promotion of morale? Although many other elements might have an effect on group interests, the more important ones are concerned with wages, hours of work, transfers and promotions, and working conditions. These are fundamental issues, for example, in every company-union contract negotiated. This thesis has been devoted almost entirely to analysis of the application of job analysis to these problems. The conclusion expressed below, therefore, seems quite justified.

In a very real sense the transcendent purpose of job analysis and job specification is the equitable adjustment of grievances or their complete elimination... An appreciable amount of unrest in industry is attributable to the absence of adequate information about jobs. Gross inequalities in rates of wages, failure to inaugurate

(25) LUTIN, Ralph Hurrier, Industrial Organization and Management, (New York and London: Harper and Brothers 1945), p. 302.

a systematic plan of promotion, favoritism and injustice in the execution of transfers and promotions, inability of department heads to appreciate fully the intricacies of jobs, and lack of intelligent comprehension of human qualities, all create discontent that often develops into serious grievances. (25)

We might well wonder to what extent union organizations will participate in the job analysis. We have experienced in this country, along with the growth of unions, more and more employee participation in what was previously always considered management functions. For example, it is quite common practice, particularly in business and industry, for representatives of employees to sit with management in determining such personnel policies as how employees will be hired, promoted, laid off, and recalled from layoff; or in determining matters of seniority, vacations, hours of work, and rates of pay. We shall discuss neither the pros nor cons of such joint efforts. However, it is pertinent to discuss briefly the extent to which employee unions are participating in job analysis, which has been in the past a quite jealously guarded management function.

In past practice, unions have been somewhat openly opposed to job analysis, for various reasons. The chief complaints were: 1) that job analysis tends to promote job simplification. It is claimed, for example, that

...not to be overlooked is the tendency of job evaluation systems to create hundreds of job classifications where only a few dozen previously



existed. (This happens, of course, from other causes as well.) With more classifications in the plant than formerly, it means fewer employees in each classification and consequently weakening of seniority protection. Nothing need be feared, however, where there is a strong union and a sound union contract with a good seniority clause. (27)

This subject is discussed further under the section Job Engineering; 2) that it tends to break a trade up into many crafts. As stated by John F. Frey, who expressed the view of the Metal Trades Department of the A. F. L. regarding the "Final Report of Wage and Personnel Survey of the Personnel Classification Board"--

You have already had your attention called to the fact that some of the mechanical trades have been divided up into 12, 18, or 20 different crafts, each with a different group (hi. scale) of pay... That is the very thing which this trade union movement has fought against from the beginning. (28)

Many unions still disapprove of some aspects of job analysis, primarily because in effecting organizational economies it 'waters down' pay rates. However, the majority accept it as an inevitable advancement of systematic management. They, therefore, have not confined themselves to a carefully guarded participation in the job analysis program.

Some national unions caution their local representatives that with respect to job analysis, "only necessities will result

(27) Hall, Frank, op. cit., p. 77.

(28) Report of the Proceedings of the Fifty-first Annual Convention of the American Federation of Labor, (Held at Vancouver, B. C., Canada, 1931), pp. 317-318

if the union takes over functions which belong to management."<sup>(29)</sup> This is based on the logical reasoning that if the policies, developed through participation of union officers, were subsequently disagreed to by employee members, the union officials and not the company would bear the brunt of the attack. Also, it recognized that the union, in such case, would be in no position to rectify the situation.

The position taken, therefore, by most unions, not to be a joint party to management's initial job of analysis seems sound. It is to secure, by contract, if possible, the right to recommend and review proposals (workers bring to this function a thorough knowledge of the job); to participate in the maintenance of the plan; and to contest through an orderly grievance procedure, job descriptions with which it disagrees. Typical instructions to this effect given by the union follows:

The local union should refuse to become a party to or be bound by any...systems which management may use to establish job evaluations. ...we let the company use whatever method it pleases. If the result is satisfactory, well and good. If it is not, the company will hear from us. The union should always reserve the right to challenge any job values which it finds unsatisfactory and to utilize any and all factors bearing on the case.<sup>(30)</sup>

Examples of typical clauses in industrial labor contracts illustrate current practices of union participation.

(29) HALL, Frank, *op. cit.*, p. 78.

(30) United Electric Radio and Machine Workers of America, *op. cit.*, 1943, p. 77.



Immediately upon the signing of this agreement the parties hereto shall review the classifications of all employees covered hereby and where, on the basis of the work performed, employees are found to be improperly classified, the conditions will be corrected and employees paid the rate for the job. In this connection it is understood and agreed that differences of opinion with respect to classification shall be subject to the grievance procedure established by this agreement.

Wherever either party desires a change of job specifications, it shall submit to the other in writing, the name and the job number of the job specification or specifications that it desires changed and the reason or reasons for suggesting the change. In the event of disagreement, the item or items in disagreement would be referred to an arbitration board consisting of 3 members.(31)

#### Job Engineering

Job engineering, sometimes referred to as job simplification, or division of labor, is an end product of job analysis. Surprisingly enough, though many personnel departments applied this technique, especially during the last war, it has been used quite informally, and there is practically no literature pertaining to it. The author defines it as "The process of reorganization of jobs systematically as to content, scope, performance methods, tools and equipment, and surrounding conditions to achieve the following:"

(31) Gilberts Association, Inc., Industrial Relations Department, Current Utility Labor Agreements, (New York: Gilberts Association, Inc., 1945), p. 7.

1. Combination of tasks within jobs and distribution of tasks among jobs for best utilization of the skills of available workers, and for best efficiency and balance in the flow of work, and for systematic improvement of the labor force.
2. Reorganization of the specific methods followed in job performance and improvement of working conditions, for conservation and most efficient use of the worker's effort.

Job engineering is accomplished through job analysis, and is equally applicable to shop, clerical, administrative, or technical jobs. In principle, it is simple, involving the study of a job, to determine if the work cannot be split up so that, for example, two jobs may be made in the place of one. For example, let us suppose two highly paid employees are classified on a job which required, in addition to high skilled tasks, many duties of lower skill. If the flow of work is heavy enough, the lesser skilled tasks may be removed from the original job and incorporated in a new job. The latter, obviously, by requiring a lesser degree of skill would rate a lower pay. It would also require less experience and training. The results illustrate the theory of job engineering. One employee is retained in the higher skilled job, while the other is assigned to the lower skilled--and of course, lower paid--job. Following is an example of job reengineering in the accounting field:

Let us examine very briefly an operation which the accountant performs, and let us split it into HCO and RCO work. (These two acronyms are used to represent the extreme in the scale of clerical salaries and are symbolic of 'head' and 'routine' work.)



When the accountant wants a statement of financial conditions he would insert the titles of the columns to be filled in and list the items and then stop. He has completed his \$30 job. The copying of the figures from the ledger to the statement then becomes a \$90 job.(32)

The great advantages of job reengineering to management are quite readily apparent. Most important, of course, is its contribution to greater productivity.

Adam Smith, writing in his *Wealth of Nations* in 1776, suggested three reasons why the division of labor increases production; it affords an increase of dexterity in every workman, effects a saving of time otherwise commonly lost in passing from one kind of work to another, and leads to invention of a great number of machines which assist the laborer in doing the work of many.(33)

In our present day, job reengineering is one secret of the mass production, assembly line type of organization for which the United States is noted. Though the reduction of the number of different kinds of skill-levels of tasks involves, and increases, therefore, the rate of repetition, it enables blue- or white-collar workers to more easily master their duties and increases their rate of output. Particularly during periods of labor shortage, as during the last war, job reengineering was found particularly useful in permitting the hiring of untrained help, speeding the upgrading

(32) MITCHELL, John, Duties of Today's Office Manager, "Office Organization and Personnel Problems", New York: American Management Association, 1941), p. 12.

(33) SMITH, A. S., and MILL, F. S., op. cit., p. 120.

of present personnel, and adapting jobs for women workers.

What is labor's attitude towards job reengineering? As might be expected, many of the things which make it attractive to management form the basis for a rather general antagonism on the part of organized labor. The resultant lowering of the wage scale, increase of lower skilled employees in an organization, the need for fewer total employees because of greater individual productivity--all contribute to this attitude. For example, union officials are warned by their international organization--

The company may decide to break down certain ... jobs to make more jobs, and simpler ones. This practice may help maintain production where skilled workers are scarce, but it may also be used as an excuse to reclassify the jobs... and pay less for them. Often the company gives as the reason the fact that heavy lifting was required on the original job, but not on the new one. Nevertheless, when it breaks down the job into its component parts and has a laborer do the lifting, it pays him a lower rate also. (34)

Management's rebuttal is that in spite of union opposition, there is reason to believe workers obtain benefits from such activity, chiefly in view of the fact that it tends to make mastery and performance of jobs easier. Also, that it facilitates promotions by reducing the job to skill between occupations. (35)

(34) United Electric Radio and Machine Workers of America, 1943, op. cit., p. 64.

(35) MITCHELL and DUBOIS, 1929, op. cit., p. 128.



### Organizational Development and Planning

Organizational planning must necessarily involve application of the principles and techniques of job analysis. This is because the latter involves an analysis of the very foundation of organizational structure--the job. In this sense, a job is defined as consisting of "the activities of an individual in the division of labor of an organization. It is exactly that, no more and no less--a functional unit of organization." (36) A summary of steps necessary in the development of any organization illustrates the relationship of job analysis to this activity.

1. Determine activities and functions:  
...accurately determine the activities and functions that shall be performed in order that the unit supervised may accomplish its objectives. ...for example, the executive or supervisor determines that he needs manufacturing, distribution, marketing, accounting, credits, etc. He makes a complete list of these major activities and of the sub-divisions under him.
2. Divide functions into jobs: ...divide carefully these activities into organization units and into definite positions, assigning to each unit and positions the functions, responsibilities and authorities that go with it. ...the ultimate objective of all... activity is the performance of the rank and file workers. In between the rank and file and top management is a great body of line and staff activities and people whose primary functions are to relieve top management of detail and secondary considerations.

(36) HOPKINS, J. O., Salaries, Wages, and Labor Relations, (New York, The Ronald Press Company, 1937), p. 29.

3. Determine number of workers needed for jobs: Having determined the activities and functions required, and having set these up on a basis of sound organization structure, it is necessary to determine the number and specifications of individuals required for these positions and activities. Therefore, ...for each position there should be a list of specifications required of the individual to fill it successfully.
4. Select the personnel required. (37)

In this application of job analysis, there may well be a consideration of principles involved in several of its by-products. For example, jobs must be created in such a manner that their contents comprise the best combinations of tasks from the standpoint of their relative skill, training time required for their performance, and relative value from a pay standpoint. The specialized techniques of job reengineering and job evaluation have been developed specifically to accomplish these objectives. (Refer to Figure 2 for an illustration of the application of job analysis to a determination of manpower requirements, and labor costs. The application and relationship of such supplementary techniques as job evaluation and time and motion study is also suggested.)

Probably more common is the application of job analysis to the planning and review of existing organizations. In this respect it provides an

orderly inventory and analysis of the duties and responsibilities of positions, the discovery of their supervisory relation-



ships, and the tracing of flow of work. ...although the classification process does not of its own force carry with it authority to prescribe or change organization structure, lines of responsibility, work-sequences, or the number of positions of each kind, it must go into these factors and the results show what exists in all these respects. The picture thus revealed perhaps for the first time, may be so illogical or wasteful that it calls for attention and correction. Whoever may be the official having the power to make the correction, the classification facts are his basic tools and the classes of class titles of the position classification plan his language for expressing such corrections and making them plain to others. (38)

### Budgets

Job analysis provides reliable and specific information needed for the preparation and review of budgets. The latter activity, of course, would be quite incomplete if it did not include careful estimates of the kind and amounts of worker services that must be bought by any organization. The making up of budgets require liaison between operating supervisors or department heads, general managerial heads, accounting or fiscal heads, and quite often representatives of the personnel department. Marsh discusses the application of job analysis in the public personnel field

Because of the uniform, defined terminology it affords, the classification plan can be used by administrative officials as a definite tool for presenting requests for funds for personnel services in comprehensible form. Schedules of positions are built upon the official class titles, leaving the same meaning to the writer and the reader

of schedules, each title being supportable, if necessary by an official explanation in the form of a class specification.

Furthermore, the executive and legislative agencies concerned with recommending or passing upon the requests of administrative heads for appropriations are enabled to get a clear picture of the organization and position-content of the different operating units as a basis for action.(39)

### Health and Safety

Medical and safety engineering programs are frequently closely coordinated with job analysis activities. This has resulted in the provision of job analysis information on the surroundings and hazards of jobs on which medical and safety divisions can base often more comprehensive programs of accident and ill-health prevention. Systematic and thorough job analysis serves a two-fold purpose in this respect: they provide information concerning the presence of uncomfortable and even dangerous surroundings or equipment conditions that might result in losttime, injuries, and employee compensation claims; and they reveal occupations whose wage rates might possibly be reduced through correction of such conditions, at monetary savings to the organization. The latter is explained by the fact that practically all job evaluation plans recognize that the presence of undesirable surroundings or serious hazards on a job warrants additional pay for such incumbents as compensation for their exposure to such conditions. Todd and Metcalf state:

(39) TANNON, Inner, Ibid., 1942, p. 68.



The use of job analysis to detect conditions at jobs which are detrimental to health and safety of the workers is not familiar... Especially in relation to the medical and safety work of the plant study of jobs has been shown to result in improvements and in reduction in expenditure of sickness and accident.

Such study in one plant disclosed the situation that there was in one department a bronze bath operation. The fumes from this work were so noxious that the foreman had to leave for a month's vacation every six months in order to recover sufficient health and strength to continue work; no worker was ever known to stay at the operation more than three months.(40)

#### Fatigue Studies

In conclusion, it must be mentioned that, as in matters of health and safety,

Job analysis, when thoroughly applied to any job, not only uncovers defects in its handling which may have gone on unobserved for years, but it also shows how they may be overcome, what remedies to apply and how to apply them. For instance, fatigue studies have demonstrated the practical value of rest periods at stated intervals.

For operations engaged in high-speed production or continuous-operation work, this is most essential; and yet without job analysis these fatigue studies and the good results they have brought would be impossible.(41)

#### Personnel Research

A review of the many applications of job analysis which have been discussed here, make the conclusion inevitable that

(40) TAYLOR, and MURKIN, op. cit., 1926, p. 251.

(41) HARRISON, J. E., op. cit., 1937, p. 72.

it should be an important factor in contributing to a program of personnel research. The latter is assuming a more and more important position in the administration of modern government, business and industry. The significance of job analysis in relation to scientific research in the problems of time and motion study, job evaluation, organizational development and planning, and budgets have been suggested. A similar intimate relationship exists between job analysis and studies of health and safety and fatigue. (See Figure 6.)

Occupational disease and fatigue have their causative roots in nature of the jobs or its environmental factors, and an analysis of all causative conditions is fundamental to remedial action. A study of industrial accidents invariably involves an analytical study of the anatomy of those jobs that have a high accident frequency and severity rate. Only in this way can the hazards peculiar to particular jobs and machines be uncovered and proper safeguards devised to reduce accidents.(42)

Detailed information regarding structural and functional aspects of jobs are essential to the solution of these problems. The following quotation applies equally well in business and government, "Job analysis may appropriately be described as the first step in industrial research."<sup>(43)</sup>

(42) WATKINS, C. S., and POPE, F. A., op. cit., 1938, p. 128

(43) Ibid., p. 128.



## CHAPTER V

### CONCLUSIONS AND RECOMMENDATIONS

The analysis of the relationship of job analysis to public and private personnel administration, which this thesis has attempted, reveals convincing evidence of its fundamental importance and broad usefulness. Its use in the civil service, and public employment service, business, industry, the armed forces, and education testify to its importance as a major function in itself, equally applicable to any kind of organization. In testimony of this, its procedure, techniques, and potentialities in the field of management have commanded the attention of specialists and writers in the fields of political science, engineering, personnel management, economics, education and psychology.

(Of course, as with every new development of management, there are those who oppose the idea of job analysis. Some are in the ranks of employers. They believe in that type which allows each kind of worker to make his own way without realizing the necessity. Then there are some from the ranks of labor who also hypercritically and occasionally all attempts of employers to apply scientific principles to such personnel functions as employee selection and transfer, and establishment of wages and salaries. In such cases they attribute job analysis to a materialistic desire for profits. This is, of course, true to a certain extent. The original impetus of most personnel management functions has come from the fact that they were considered 'good business'. This is especially true in the case of such applications of job analysis



as job reengineering and job evaluation, because profit is the lifeblood of modern capitalism. In the government, of course, the profit motive may be paralleled by a desire for budgetary savings.

There are some organizations which tend to oppose job analysis as weakening collective bargaining. Unless it is unscrupulously employed, this position can only be construed to mean that the more chaotic the conditions surrounding a job in an organization, the better chance for a strong union to take advantage of management.

Actually it has been found that job analysis serves not only to enhance the efficiency of the entire personnel department, but contributes greatly towards the important social objectives of worker satisfaction and occupational adjustment. The significance to management of job analysis in recruitment, transfers and promotions, job evaluation, labor relations, and practically every phase of activity of a composite public and private personnel department has been suggested. Its advantages to employees, on the other hand, are in direct proportion to the extent that it facilitates a more scientific, objective, and fairer administration of these functions--for they are all concerned with the best means for utilizing workers on jobs. It is really quite immaterial whether or not job analysis has been developed through the acquisitive desire or through altruism, since it benefits employee and employer alike.

Recommendations**Standardization of Terminology**

First, it seems desirable that greater attention be directed toward standardization of terminology used in job analysis. As has been suggested previously, there are almost as many definitions of terms used as there are users of job analysis. This has almost obscured the important fact that fundamentally most types of job analysis programs in public and private enterprise are really quite similar in procedure and techniques. The development of standard terminology would not only provide a more ready means of comparing various types of job analysis plans, but also would serve as a basis for standardizing basic job analysis techniques, as suggested later.

**Direct Observation of Jobs**

Whatever the application or objective of job analysis, the necessary information should be gotten primarily through direct observation. If the plans reviewed, the majority provided for the use of questionnaires to some extent. Many of these provided for the exclusive use of this method of analysis. Programs where the latter practice is in force contribute greatly, it is felt, to the attitude of the few who believe job analysis too unscientific and subjective.

Obviously, since the average employee is not hired for his facility in describing jobs, he usually is quite incapable of conveying the valuable store of information he



may possess regarding his job. Of course, there is a place and sometimes a necessity, for the questionnaire in the job analysis program. In the analysis of 'white collar' jobs a combination direct observation-questionnaire method may be employed quite successfully. In this respect, it is suggested that the questionnaire be sent out to the employee in advance of the visit by the analyst. The information secured serves as a basis for establishing a rough and preliminary classification of work activities. This enables the analyst to plan his program better, and to prepare himself beforehand for the type of jobs he will encounter. It is felt that the use of questionnaires for analysis of 'blue collar' jobs, however, should be avoided if possible.

Whatever the application of the questionnaire, extreme care should be given its preparation. (See Figure 7 for a suggested form.) The primary objective here is the provision for separate sections calling for the 'what', 'how', and 'why' the job is performed. It is felt that this may be a partial answer to the problem of getting employees to describe not only their duties, but more important, the skill required to perform them. Conspicuously absent are questions on length of time required to learn a job and the education required. It is felt that this information, if nothing else, must be secured through analytical observation and questions by the analyst if any degree of accuracy is necessary.

You often the employee, and even his supervisor, are prone to exaggerate or fail to analyze properly, when answering such questions.

### A Basic Skill Analysis

Finally, it is felt that the greatest need in the field of job analysis is for the development of a basic and standardized plan for analyzing and reporting job duties and skills. While a great many available sources outline various procedures for securing job information for such purposes as wage evaluation, or the construction of aptitude tests, or recruitment, most of them have the same limitations. They usually merely include a statement, without explanation, that duties and skills should be analyzed and recorded. The details of how this should be accomplished are frequently overlooked. Further, there is the substitution of a statement that it is impractical to discuss a single plan extensively since it all varies the nature of the problem determines the job analysis procedure.

No matter what the application or objective of the job analysis, there is always one common and essential requirement--a accurate evaluation and accurate reporting of duties and skills of jobs. It is agreed, only that the amount of detail which need be presented in the job description is determined by the nature of the study. For example, the amount of detail possible or necessary for presentation in a dictionary of occupation titles would certainly be far less than that



needed for use in the construction of achievement tests.

The needs for research in better methods of analyzing and reporting skill differentials between jobs is becoming greater and greater as time goes on. This is because we are experiencing a continual increase in the number and complexity of jobs into finer and finer divisions. Frequently, the distinction between these from a skill standpoint is almost impossible to determine with our present job analysis methods.

For example, in the 'white collar' field, it is quite common to find the job of Secretary broken down into three or even four jobs. These separate jobs, differing only in the degree of skill called for, are usually identified by titles ranging from Secretary, Grade A (or 'senior'), to Secretary, Grade B (or 'junior'). Such job divisions are probably even more common in the 'blue collar' field. Here, for example, we find the job of labor operator broken down into separate jobs titled Grade A, B, C, D. Each of the jobs, of course, involves different hiring requirements and pay.

In such cases of job breakdown, unless the distinction in skill between the various jobs is clearly stated in the job description, only confusion and continual employee grievances will result. A lack of discriminating information must necessarily involve subjective interpretations.

The best plans developed so far have attempted to analyze

skills in terms of mental and/or physical 'factors' or characteristics. For example, Deane breaks skill down into three component factors, which he terms muscular, accuracy, and thinking (with little definition of these three categories, however). His very general definition of skill follows:

The word skill is used with a variety of meanings. It may refer to practical ability in art or science; so, we speak of the skilled artist or chemist. It may signify power to visualize or to perform. As in the case of a toolmaker. Sometimes it means manual dexterity, coupled with little or no technical knowledge, as with many machine operators. Whatever the nature or skill, the word usually refers to the quality of performance. It is characterized by precision in coordination of the senses, knowledge of muscles involved. Not all artists or chemists, toolmakers, and machine operators are skilled; not all individuals performing these occupations with high quality of output are skilled in their respective lines.(1)

In the public service the problem of skill is attacked through use of five "ultimate classification factors", which collectively constitute the basis for personnel classification. They are:

1. Subject matter, function, possession, or occupation represented.
2. Difficulty and complexity of duties.
3. Nonsupervisory responsibilities.
4. Supervisory and administrative responsibilities.
5. Qualification standards.(2)

Of the existing techniques that might most profitably be

(1) HANKE, Eugene J., Breaking the Skilled Labor Bottleneck, New York, The Foreman's Institute, 1945, p. 3.

(2) HANLON, op. cit., 1942, p. 92.



scrutinized and considered in the development of a basic skill analysis plan, the many job evaluation plans in the private field offer the greatest possibilities. Here much research has gone into development of the characteristics or factors that best describe job skills. The result has been the establishment of a tremendous number of factors that are claimed to measure one aspect of skill or another. While the ultimate objective of many job evaluation plans is a quantitative expression of skill, this is always based on a qualitative description of skills prepared beforehand.

Attempts have been made to determine whether or not there are fundamental qualities or factors which enter to some extent in every job, and which collectively would comprise at least the basic skills of every job. Figure 5 illustrates a job analysis worksheet based upon such a study. In this case, it was assumed through analysis of skill factors developed in job evaluation studies, that those skill factors possibly common to most shop and office jobs were: Knowledge of work acquired through education; and/or knowledge of work gained through experience; Responsibility--supervisory or non-supervisory for matters pertaining to shop or office; Mental application, consisting of attributes such as initiative, ingenuity, independent judgment, and adaptability; Dexterity, concerned with physical manipulative skills required by jobs involving such duties as operation of shop or office machines. It is noted that "Working Conditions" is included on the

worksheet. While this is not a skill factor, it is commonly required in the analysis of all jobs.

The foregoing plan is far from being the final answer to development of a basic skill analysis plan, of course. For one thing, possibly it could be best to develop, rather, two basic skill plans. One could be designed for shop jobs, and the other for office jobs, for it is quite difficult to devise a plan to cover both. For another thing, a problem immediately presented by this plan is that we do not have as yet any useable standardized data regarding the average length and type of education or of experience required for at least representative kinds of shop, clerical, technical, or administrative jobs. This may result in very subjective determination of the extent to which the two factors, Education and Knowledge, and Experience and Required Knowledge are required of a worker by a job. This, in itself, is an important research problem, particularly in the field of job evaluation, where pay is based upon considerations of such factors. However, it is felt that the principles involved in this and similar studies are worthy of consideration and further research in the problem of better determining and defining skill.

#### Future of Job Analysis

There has been a steady increase in the study of jobs in business, industry and the government since the very beginning of the job analysis and classification movement. The increase



As volume of job analysis work has been accompanied by significant improvements in job analysis procedures and techniques. It is becoming a very specialized activity requiring the services of personnel specially trained in its techniques. There can be little doubt that job analysis will continue to grow in stature, and that it will eventually occupy an even more significant place in personnel administration in government and industry. This would simply mean that this activity would justify the confidence placed in its present importance and future promise by recognized authorities in public, private, and military management.

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CHAPTER A



FIGURES

Figure 1---Sample Job Description Used in Industry

Figure 2---Naval Job Analysis

Figure 3---Job Family Plan for Employee Transfers

Figure 4---Job Analysis Checklist for Test Construction

Figure 5---Flow Chart--Application of Job analysis to  
a Determination of labor costs and manpower  
Requirements. (For Governmental, Business,  
or Industrial Activity)

Figure 6---Functional Relation of Job analysis to  
Industrial Research

Figure 7---A basic job analysis questionnaire

Figure 8---A basic skill analysis reporting form

## FIGURE 1

## SAMPLE JOB DESCRIPTION

Fairchild Aircraft Division Fairchild Engine and Airplane Corporation Dayton, Maryland	New Job Labor Grade 6 effective, pending union negotiation.
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1. Job Title: <u>SEWAGE TREATMENT PLANT ATTENDANT</u>	4. Dept. No. <u>2</u> Name <u>U.S. Nat. Operations Section</u>
2. Alternate Titles:	6. No. Employed <u>1</u> Date <u>May 12, 1944</u>
	7. Plant Number: <u>20</u>
3. U. S. T. Title and Code:	5. Section:
8. Job Summary:	

Tends a sewage treatment plant used to separate and purify liquids from settleable solids in raw sewage from Plant 2 and 4, and to dispose of settleable solids; controls by means of valves and pumps the flow of effluent from Settling Basins and Digestor; purifies liquid before final disposal by maintaining prescribed flow of chlorine gas from cylinders to Chlorine Contact Chamber. Maintains and services prescribed valves and machinery, and performs and records results of simple daily test of prescribed samples of effluent and post and pre-chlorinated liquid.

(See Section 10 for description of equipment, and Sewage Treatment process.)

1. Regulates flow of settleable solids from Primary Tank to Digestor Tank, and flow of effluent from Secondary Settling Tank to Primary Tank; controls circulation of settleable solids from hopper at Primary Tank to Digestor Tank, and recirculation of effluent from Secondary Settling Tank by manually opening prescribed valves and pressing specified switches to start pumping machinery. Visually inspects level of sludge in hoppers at Primary and Secondary Tanks and ascertains time to halt flow by closing valves and stopping pumping machinery.

(One of least-skilled elements of job; consumes approximately 10% of worker's time.)

2. Controls purification of liquids: Installs retaining tanks of chlorine gas to chlorinator machine by rolling



tank onto scale, weighing full tank, and manipulating wrench to attach pipe from chlorinator to cut let valve on tank.

Starts and adjusts flow of gas by turning on water supply valves and waiting until machine begins to pull air in through vacuum relief valve; turning on chlorine cylinder valves, and adjusting flow of chlorine to prescribed rate by means of control knob on front of machine. Visually checks prescribed rate of feed of chlorine by comparing height of water column in orifice meter with scale attached to orifice meter.

Stops flow of chlorine gas during low level of sewage flow by closing valves on chlorine cylinder, waiting until chlorine pressure gauge registers zero, and air enters through vacuum relief valve, and shutting off water supply valves.

(One of medium-skilled elements of job; consumes approximately 16% of worker's time.)

3. Performs, and records results of simple tests of effluent, and on post and pre-chlorinated liquids; determines alkalinity or acidity of effluent by a simple color comparison test, i.e., adding a prescribed amount of coloring agent to sample of effluent, inserting colored specimen and clear specimen in comparator, and comparing standard colors on disc in front of clear specimen with colored sample. Records reading obtained from disc when colors are most similar. Manually obtains sample of pre-chlorinated liquid and performs simple test to determine whether oxygen content is a specified level by adding prescribed coloring agent to sample and visually inspecting color of sample after specified lapse of time.

Performs and records similar test with different coloring agent and color disc in comparator for test of post-chlorinated liquid.

Determines amount of settleable solids in effluent by allowing a prescribed volume of effluent to stand in flask for a specified time; records volume of solids obtained by inspecting graduated scale etched on flask; determines prescribed amount of chlorine added to water, in parts per million by a simple arithmetic computation and records results.

May record temperature of air, direction and velocity of wind, and information concerning daily general weather conditions obtained by telephone from airport office.

(One of highest-skilled elements of job; consumes approximately 15% of worker's time.)



4. Performs minor repairs on, and services machinery; performs minor repairs on machinery such as Comminuter or pump shafts, by manipulating wrenches, screw driver, and hammer, to replace worn cutter, shear bars, or shaft on Comminuter Comminuter, or to replace all equipment used to pump influent and effluent through treatment process by oiling or greasing prescribed fittings on pump packings, bearings, and shafts, sludge drain in Settling Tank, and roller of Comminuter Comminuter in Wet Well at specified intervals during work week.

Supervises and visually inspects building, equipment, and surrounding grounds for cleanliness.

(This highest-skilled element of job consumes approximately 84% of worker's time.)

5. Checks operations of Digester Tank, Decants liquid from Digester, and checks record of daily sewage flow, checks amount of gas accumulated in Digester, and temperature of sludge in Digester by visually inspecting gauges and recording thermometer. (A prescribed degree of temperature in Digester is maintained automatically by a thermostatic control on a gas furnace.) Gas light fire in oil furnace to maintain digester temperature if gas furnace is not operating.

Decants liquid from settleable solids in Digester at prescribed intervals of time by manipulating levers to open and close valves.

Checks and records rate of daily sewage flow by visually observing Sewage Meter and recording data obtained from graphed chart.

(One of medium-skilled elements of job consumes approximately 10% of worker's time.)

6. Regulates flow of settleable solids from Digester to Drying Bed; controls circulation of settleable solids from Digester to Drying Bed by manipulating levers to open prescribed valves, and pressing switch to start operation of pump. Visually inspects level of sludge in drying beds, and determines time to stop flow by manipulating levers to close valves, and pressing switch to stop pump machinery.

(One of least-skilled elements of job consumes approximately 1% of worker's time.)

10. ~~PERFORMS MAINTENANCE, REPAIRS AND SERVICE~~

Equipment



## 1. PROCESSING AND DIRECT DISPOSAL EQUIPMENT

### 1. Influent Processing:

Raw sewage from Plants B and C flows into Surge Chamber through a Screenings Comminutor and into a Wet Well. The Surge Chamber is a concrete container 6'x6'x6'. The Screenings Comminutor (built by Chicago Pump Co.) is essentially an electrically driven grinder which reduces coarse solids to finer, settleable size by the action of cutters and shear bars so mounted on rotating drum as to pass partially through a stationary comb. Solids not reduced by grinder are manually raised from concrete trough in Wet Well. Influent is removed from Wet Well by the individual or combined operation of three electrically driven centrifugal pumps, which are automatically started and stopped by a multiple-contact float switch according to level of influent in Wet Well. One pump may be operated by an auxiliary gasoline engine in case of electric current failure.

The influent is forced from the Wet Well through the venturi meter tube pipes into the concrete Primary Settling Tank, 30'x10'x9'; where the settleable solids are slowly moved, avoiding turbulence in the fluid, into a concrete hopper, 10'x3'x3', by wooden sludge trays.

The slow, steady motion of the trays is achieved by running chains supporting the trays over a geared sprocket on an electric motor.

### 2. Disposal of Settleable Solids:

The settleable solids are pumped from the hopper, at prescribed intervals during the week, and forced into a Digester Tank. The Digester Tank is circular in shape, approximately 18' deep by 20' in diameter, and is fitted with a floating cover to provide for submergence of all buoyant materials, and to collect sludge gas. The heated, thermatically sealed, and insulated concrete tank rests on a cone shaped, (inverted) retaining basin.

The settleable solids remain in the Digester for a prescribed length of time at a specified degree of temperature. This treatment causes a bacterial activity in the solid to throw off a waste gas.

The sludge gas not utilized in the thermostatically regulated, gas fired boiler for steam heating and Digester heating system is piped to the roof of the building and burned.



The sludge, after a prescribed interval in the digester, is pumped into glass-braced sludge irving beds, approximately 41'x24'x3', and removed for disposal after it is sufficiently dry.

The liquid in the digester is decanted (drained) from the tank back into the Wet Well at prescribed intervals to avoid building up an excess in the tank.

## 2. Disposal of Effluent:

The overflow of effluent from the Primary tanks is separated when run through a Trickling Filter. This consists of a rotary distributor driven by reaction of sewage flowing through spreader jets in four distributor areas which spray effluent over a circular bed of lime stone rocks, 40' in diameter and 2' deep. The effluent drains from the tile and concrete basin of the Filter into the Secondary Settling Tank 38'x18'x9'.

The settleable solids removed from the floor of the Secondary Tank by sludge drags are recirculated through pumps to the Primary Tank, and the overflow of effluent is diverted into the floating tank.

The floating tank, approximately 23'x12'x6', has three Alternating Siphons designed to drain the effluent in rotation into three Sand Filter Beds.

The liquids are carried from the basin of the Sand Filters, each one 32'x44'x3', to the Chlorine Contact Chamber, approximately 16'x10'x7', where it is purified by contact with chlorine gas and disposed of through an outfall sewer.

## B. AUXILIARY EQUIPMENT OF ESSENTIAL DAILY IMPORTANCE

### 1. Laboratory Equipment:

a. Hydrogen-Ion Comparator, used to determine Hydrogen-ion content of effluent by a visual comparison of a specimen of effluent with added prescribed coloring reagent, with a standard colored disc. The comparator, about the size of a miniature camera, is held in one hand and the disc is manually revolved until the colored specimen and the standard color on the disc closely match. The Hydrogen-ion content reading is obtained from a decimal figure on the edge of the selected disc. (Neutral reading is 7.0; above this the effluent is alkaline, and below it is acid.)



A test to determine the amount of chlorine in the post-chlorinated water is performed in like manner but with a different standard color disc and different coloring reagent.

b. An Imhoff Glass cone of 1 liter volume is used to determine the cubic centimeters of settleable solid in the effluent by allowing 1 liter of effluent to settle in the cone for two hours and visually comparing level of solid in the bottom with the graduated scale etched on the glass.

c. Glass beakers of varying capacity are used to manually obtain samples for tests from specified tanks at prescribed times.

d. An electric refrigerator, similar to those for household use, is used for retaining specimens of effluent at a prescribed degree of temperature.

e. Other laboratory equipment consists of retorts, test tubes, Bunsen burner, filter papers, glass and rubber stoppers, thermometers, pipets, stirring rod, faucets for hot or cold water, and a small oven; cupboard for chemicals; analytical balance and weights for weighing chemicals.

## 2. Other Auxiliary Equipment:

a. Wallace and Tiernan Chlorinator: A visible vacuum type, solution feed chlorinator, for manual operation, about the size of a water cooler, used to regulate the flow of gas from cylinders to glass bell jar on top of machine containing chlorine pressure reducing valve, vacuum relief float, and orifice meter through which gas is drawn by suction of main flow of water through machine to point of application (Contact Chamber). Operator turns knob on front of machine to regulate chlorine rate of feed as registered on scale attached to orifice meter.

b. Gas Fired Boiler: Used for both Digester and building heating systems consists of primarily, a burner for sludge digester gas with thermostatic pilot; water pressure and temperature regulator with visible gauge. In conjunction with this furnace are three visible gauges to register the amount of gas, in cubic feet, accumulated in the digester, the amount of gas used for the gas furnace, and the amount of waste gas being sent to burner on the roof.

c. Oil Fired Boiler: Used for both building and Digester heating systems when the quantity of gas is not sufficient

to allow use of gas furnace. This furnace also has thermostatic control, with water pressure and temperature regulators.

d. Taylor Recording Thermometer: A spring clock driven instrument used to record temperature fluctuations of sludge in Digester Tank by rolling graphed chart paper past a recording pen. The charts are changed at prescribed weekly intervals by TREATMENT PLANT ATTENDANT.

e. Simplex Type M Meter, Simplex Valve and Meter Co.: Used to record daily sewage flow through a venturi tube in pipe line from Wet Well to Primary Settling Tank, and consists of primarily the venturi tube, and an indicating recording and totalizing meter driven by a self-starting electric clock motor. The instrument indicates and records instantaneous rate of sewage flow in terms of gallons/minute, gallons/day. The recording chart is changed daily.

f. Other:

Baird's Scale, used to weigh tanks containing Chlorine Gas.

Chlorine cylinders about the same size as an oxygen tank on a gas welding unit, used to retain purifying gas for water.

E.I.A. Industrial Gas Mask, in box with instructions, used in case of severe leaks in chlorination system; consists of primarily a rubber face piece and flexible tube, connected to the replaceable canister.

Tools:

Shovel, shovel and rake; screw drivers, hammers, wrenches, grease guns, and hand tools necessary to service pumping machinery, screenings separator, and sludge drag; rubber hose for watering grass; brushes to scrub scum line from tanks.

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## II. VERTICAL SHAFT, MACHINES WITH SHAFT JOINT

Promoted From:

Promoted To:

Transferrable to:

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## FINDINGS AND RECOMMENDATIONS

### 12. EDUCATION AND TRAINING REQUIREMENTS:

Must be able to speak, read, and write English; to make simple arithmetic computations.

### 13. EXPERIENCE AND TRAINING REQUIREMENTS:

Six months' experience necessary to become proficient in attending sewage treatment plant, i.e. performing minor repairs on and servicing pumping machinery, performing simple tests on effluent and post and pre-chlorinated water and recording results, obtaining and recording data on weather conditions, manipulating valve levers and switches to pump influent and effluent to and from tanks, attaching chlorine cylinder to chlorinator and adjusting valve to control flow of gas through chlorinator to contact chamber, tending an oil furnace by lighting and extinguishing flame, making repetitive visual check of recording thermometer, gas pressure gauges, and gauges on chlorinator; visually inspecting venturi meter, recording rate of daily sewage flow, and changing chart in sewage venturi meter.

### 14. SUPERVISABILITY:

#### Supervisory:

Receives general supervision from WFOHMAN, Maintenance.  
May supervise one male helper.

#### Other Responsibilities:

Responsible for purity of waste water emptying into stream; for performing and recording simple repetitive test of effluent and post and pre-chlorinated water, for performing minor repairs on and servicing pumping machinery, sludge traps, and Trickling Filter; for obtaining and recording data concerning weather conditions, for maintaining Screenings Comminutor, and replacing worn cutter, shear bars, or coars of Comminutor, for maintaining prescribed temperature in Digester Tank; for visually inspecting Digester Temperature Recorder at specified periods of time, and changing chart in Temperature Recorder at weekly intervals; for attaching Chlorine cylinder to chlorinator and adjusting knob to cause prescribed amount of gas to flow into water purifying chamber; for cleanliness of buildings, equipment, and surrounding grounds; for visually inspecting venturi meter and recording rate of daily sewage flow and changing chart in sewage venturi meter.

Careless manipulation of digester gas valves and faulty operation of flame traps could result in an explosion causing

damage to equipment possibly amounting to thousands of dollars.

Improper use of Compressor, complete neglect of prescribed daily tests by ATTENDANT, and careless application of chlorine to waste water could result in damage suits possibly amounting to thousands of dollars.

ATTENDANT must exercise care when handling chlorine cylinders to prevent serious injury to others through accidental liberation of gas.

---

#### 15. SPECIAL APPLICATIONS:

Must exercise care to perform and record repetitive test of effluent, post and pre-chlorinated water; to manipulate valve levers and pump switches to force effluent to and from specified tanks; to adjust gas pressure as registered on control dial; to visually inspect and change graph in recording thermometer, and to maintain prescribed temperature of sludge in digester, to visually inspect venturi meter, record rate of daily sewage flow and change chart in sewage venturi meter.

---

#### 16. MAINTENANCE AND REPAIRS:

Must possess manual and visual ability to use wrenches, screw drivers, saws, and hand tools necessary to perform minor repairs on machinery.

---

#### 17. WORKING CONDITIONS:

**Surroundings:** Good working conditions; ATTENDANT occasionally exposed to disagreeable odor.

**Hazards:** accidental liberation of chlorine gas, or explosion of Digester Tank through faulty operation of flame traps could result in total disability or death of ATTENDANT.

---

#### 18. PHYSICAL REQUIREMENTS:

Light physical exertion required to handle tools used to maintain machinery, and to manipulate valve levers. Lifting lifts over 50 pounds, may lift heavier weights with



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assistance of helper. ATTENDANT must not be afflicted with asthma or bronchitis due to possibility of irritation through unavoidable exposure to mild concentrations of chlorine. ATTENDANT must not be color blind in order to visually compare specimens in Hydrogen-Iodine Comparator.

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DEFINITIONS

Influent: Raw sewage flowing into a treatment plant.

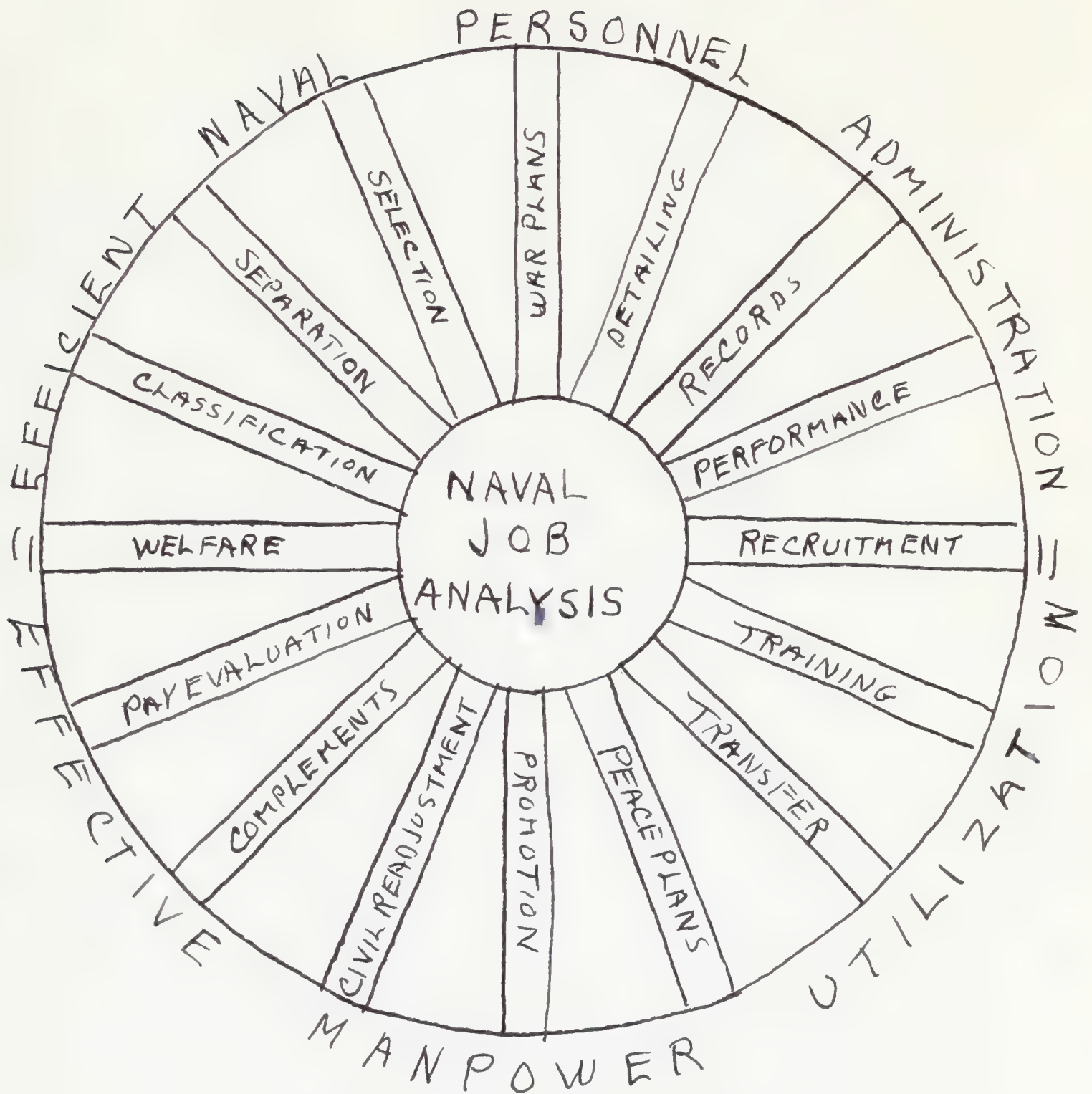
Settleable Solids: Those solids settling out of the influent during treatment.

Effluent: The liquid discharge flowing from a treatment plant.

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Analyst J. M. Ellis Supervisor H. F. Smith

Review-  
by A. S. Sawyer  
Chief, Labor  
Utilization Dept





## FIGURE 3

JOB GRADES FOR THE METAL TRADES

<u>Labor Grade</u>	<u>Job Code</u>	<u>Job Title</u>	<u>Test.</u>
MAJOR GROUP 1. TECHNICAL MANUAL WRITING (000-006)			
---	000	Editorial Assistant, Grade A	197
---	001	Editorial Assistant, Grade B	197
---	002	Editorial Assistant, Grade C	197
MAJOR GROUP 2. MECHANICAL ILLUSTRATING (007-014)			
---	007	Mechanical Illustrator, Grade A	197
---	008	Mechanical Illustrator, Grade B	197
---	009	Mechanical Illustrator, Grade C	197
MAJOR GROUP 3. MECHANICAL--METAL FINISHING, ASSEMBLY AND LAUNCH			
Subgroup A. <u>Parts and Tool Work</u>			
1		Tool and Die Maker	180, 192
2		Jig Builder, Floor	180, 192
3		Bench Mechanic, Grade A	180
3		Tool and Jig Mechanic, Grade A	192
6		Bench Mechanic, Grade B	180, 192
6		Tool and Jig Mechanic, Grade B	192
7		Assembler, Fittings	108, 176, 180
8		Jig Builder Helper	192
10		Burrer	101, 103
Subgroup B. <u>Saw Conditioning</u>			
		Saw Filer	392
Subgroup C. <u>Layout, Metal</u>			
3		Layout Man, Template--Grade A	192, 180
5		Layout Man, Machining, Grade A	101
6		Layout Man, Template--Grade B	192, 180
7		Layout Man, Machining, Grade B	101

## FIGURE 4

## JOB ANALYSIS CHECKLIST FOR TEST CONSTRUCTION(1)

## 1. IDENTIFICATION OF THE JOB

Name of the occupation. Identifying symbol. Alternative names. Names and locations of departments in which the work is carried on. Similar occupations from which or to which workers could be transferred.

## 2. WORKER INVOLVED

Present force. Anticipated requirements.

## 3. TYPE OF WORK

Statement of the duties, functions and responsibilities connected with the job. This should be a broad identifying statement, and should not cover the method of carrying out these duties nor the abilities required.

## 4. TECHNICAL EQUIPMENT

Tools: What kind of tools? Who supplies them? Who is responsible for their upkeep?

Machines: What type? In what condition? Who is responsible for upkeep?

Materials: What kind? What variations? Description of materials.

## 5. EXACT OPERATIONS

The exact duties and the ways in which they are carried out. This should be in narrative form and in great detail. Operations should be listed numerically in sequence. Begin each item with an active verb. Give the amount of time devoted to each operation and its relative importance. Describe the exact motions in form that may be suggestive of test construction. What parts of the body are used? Are movements standardized? What repairs or adjustments to the machines or equipment does the worker have to make?

(1) WERNER, Walter Van Dyke, and FOSTER, Ray, Procedures in Personnel Psychology, (New York: McGraw-Hill Book Company, Inc., 1926) p. 16.



### 6. CONDITIONS OF WORK

Location: Factory, office, inside, outside, overhead, underground.

Surroundings: Ventilation, temperature, humidity, illumination.

Time: Permanent, temporary, day, night, hours of labor per day, hours per week, overtime, peak loads, uniformity of work, rest pauses, lunch hour, vacations.

Postures: Standing, sitting, stooping, walking, climbing, reaching, lifting, kneeling.

Speed: Quick, moderate, slow, variations in speed. Necessity for turning out work extremely fast to meet an emergency.

Accuracy: Coarse, fine, exacting. Possibility of loss through inaccuracy.

Automaticity: Varied, routine, monotonous, mixed.

Health Hazards: Nerve strain, eye strain, physical strain (heavy, medium, light), moisture, heat, dust, fumes, acids, exposure to weather.

Accident Hazards: Slippery floors, unguarded machinery, pointed tools, rapidly moving objects, liability to burns.

Disagreeable Features: Dirt, noise, oil, and others included above. Vibration. Fatigue. What are the most frequent or serious grievances?

Desirable Features: Cleanliness, prestige, companionship.

Social Features: Does the employee work alone or with others? Is he permitted to talk? How close is the supervision over him?

Standards of Output: What standards must be met? How are quotas set? Is inspection uniform and equitable?

### 7. PAY

Method: Monthly, weekly, biweekly, daily, hourly, piece-rate, guaranteed hourly minimum plus bonus, clock, or cash.

Rate: Average earnings, range of pay, starting pay, maximum obtainable. How often are advances in pay given?

Bonuses and premiums: When given? How much? On what basis?

Penalties: For absence, tardiness, infringement of rules, spoilage.

## 8. NON-FINANCIAL INCENTIVES AND REWARDS

Social rewards for good work. Incentives to speed and high quality of output. Prestige connected with the job.

## 9. TRAINING

Is training given by the company? In vestibule school or on the job? What does it cover? How long does it last? How much does it cost to train a worker? What percentage of new workers complete the training? How is the worker paid during training?

## 10. BROADER SOCIAL ASPECTS OF THE JOB

What are the ambitions and ideals of the workers? What are their standards of success? What employee service does the company make available? Hospital, insurance, sick benefits, pensions, loans, employee stock ownership, employee representation in management, social work, night classes, recreation, home or an, housing. What is the psychological effect of the job on the worker? What sort of home life do the workers have? What are their living conditions in general outside of the factory? Fatigue, recreation, temperance, marriage. Social status of fellow workers.

## 11. RELATION TO OTHER JOBS

Organization charts, steering lines of promotion, lines of authority lines of routine procedures. Comparison with other jobs in regard to salary, opportunity for promotion, prestige, and so forth. Is the acquired skill an asset outside of the company?

## 12. EMPLOYMENT CONDITIONS

Selection: How are workers selected? How efficient is this method? What other methods have been used? What could improve methods of selection accomplish? Sources of supply, Unions.

Promotion and Transfer: What opportunities for either? Adequate personnel records? Periodic rating and consideration for promotion or wage readjustment?



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Turnover: What is the turnover? What are the most frequent causes of leaving?

13. RECORDS

What records of output, rate of progress, quality, spoilage, materials, time, and so forth, are available? Application blanks, references, ratings, and so forth.

14. PROBLEMS

What are the main personnel problems which this job has raised?

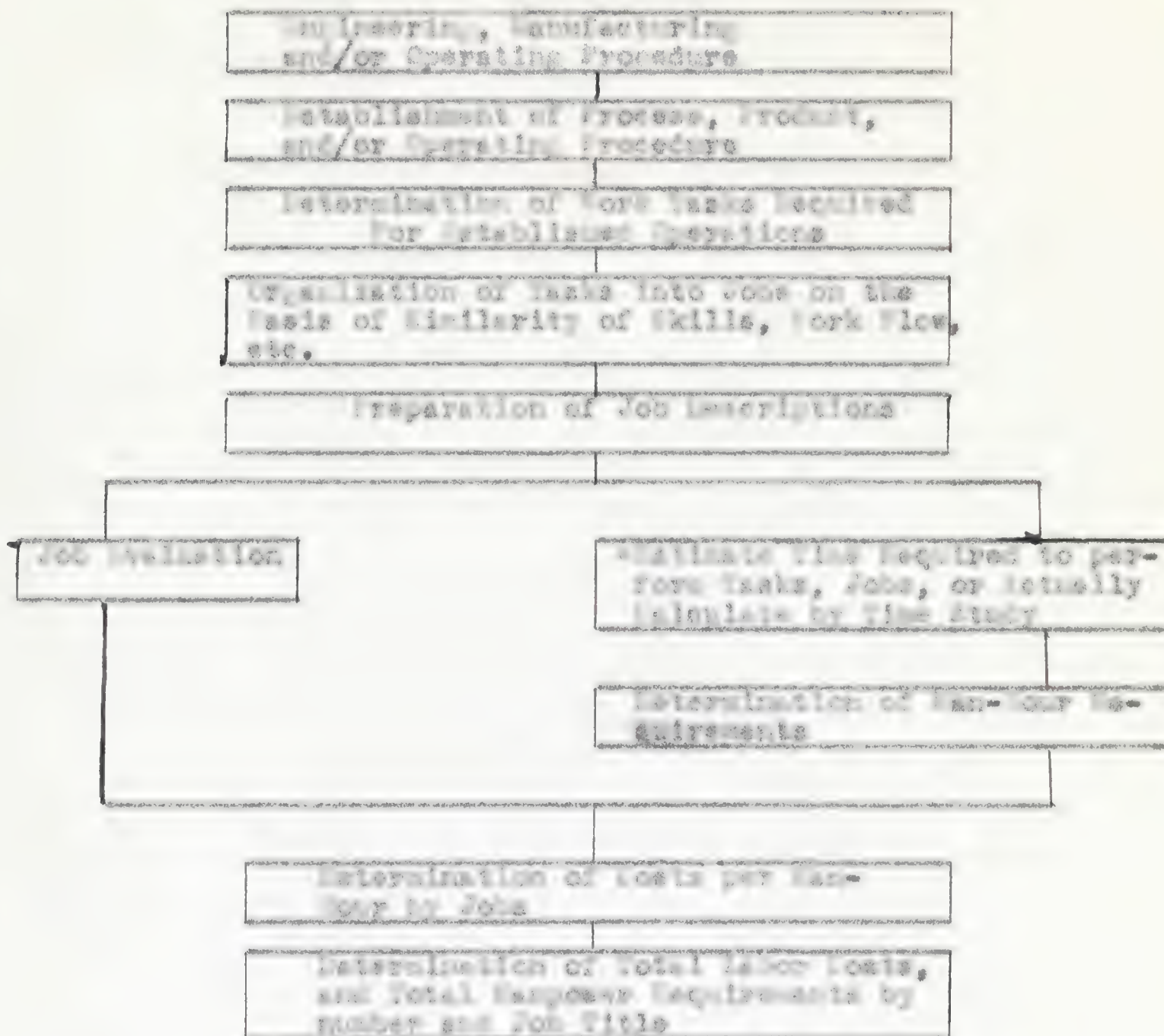
(99)

FIGURE 2

JOB COST

APPLICATION OF JOB ANALYSIS TO A DETERMINATION  
OF LABOR COSTS AND MANPOWER REQUIREMENTS

(For Governmental, Business, or Industrial Activity)



While step is possible by time study only if jobs lend themselves to such treatment.



FIGURE 8

FUNCTIONAL RELATION  
OF JOB ANALYSIS  
TO INDUSTRIAL PURPOSES



WATKINS, E. E. and MITCHELL, Fred, The Management of Labor Relations, New York, McGraw-Hill Book Company, 1936, p. 120.  
(Quoted by E. E. Jones in Job Specifications, Federal Board for Vocational Education, Bulletin 41, pp. 11-12.)

## FIGURE 7

## A BASIC JOB ANALYSIS QUESTIONNAIRE

Employee's

Name

Date

Title

Grade

Dept.

Div.

Post.

Employee's Immediate  
SupervisorSupervisor's  
Title

To the Employee: The information sought through this form is essential for improvement in wage and salary administration and other matters of vital concern to you. Your best cooperation will be appreciated.

## 1. WHAT DO YOU DO?

- List your normally assigned duties, in order of importance. (Do not describe duties in detail under this item. Do not confuse what you do with the purpose of doing it.)
- For each duty, show a rough estimate of the percentage of your working time required over a period of one month or more.

DutiesPercent  
of Time




2. WHY DO YOU DO IT?

State briefly the purpose of each duty listed under item 1 above.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_

3. HOW DO YOU DO IT?

For each of the duties listed above (item 1), describe the essentials of the procedure or method which you follow. Consider each of these elements of the duty described.

- (a) Typical nature of problems to be solved or changes to be produced in materials worked with.
- (b) Typical information received either to guide your work or to be processed; and the form in which such information is received (oral, instructions, sketches, part blueprints, standard specifications, standard procedures, etc.)
- (c) Choices of method exercised by yourself, and consideration affecting such choices.
- (d) Knowledge and judgment employed in solving the problems or obtaining the desired results.
- (e) Tools and equipment used; and how you use them.

Duty #1:

(108)

Duty #2:

Duty #3:

Duty #4:

Duty #5:

Duty # 6:

Duty # 7:

Duty #8:

Duty #9:



Duty #10:

## 4. SUPPLEMENTARY INFORMATION

- a. What occasional duties do you perform (exclusive of those described under item 1 above)?
- b. Name and describe the need for any special physical qualifications such as manual dexterity, or coordination required in the performance of your job.

- c. Who assigns your work:

\_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Title)

- d. Review---

- (1) Who reviews or evaluates your work:

\_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Title)

- (2) Are you told specifically what corrections must be made? (Check)

\_\_\_\_\_  
(Yes)

\_\_\_\_\_  
(NO)

- (3) Are you told specifically how to make needed corrections? (Check)

\_\_\_\_\_  
(Yes)

\_\_\_\_\_  
(No)

- e. How much time does a typical work assignment require for completion?

\_\_\_\_\_  
Days

- f. Is your work typically checked prior to completion?

If so, by whom?

\_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Title)

- g. List any equipment, instruments, tools, materials or records which you are responsible for maintaining, adjustment, or servicing and those which you must use in your work.

- h. On what matters do you personally make decisions in regard to your work and act on them without consulting your superior?
- i. Do you supervise any other employees? (Check) (Yes) (No)
- (1) How many employees do you supervise? (Total)
- (2) List their job titles and show number of employees classified under each title?
- (3) Name the division, section, or unit which you supervise, if any.
- j. Do you make recommendations concerning the disciplining, hiring, dismissal, promotion, and transfer of employees under your supervision? (Check) (Yes) (No)
- k. Do you decide cases of discipline, hiring, dismissal, promotion and transfer involving employees under your supervision? (Check) (Yes) (No)
- l. What do you regard as the most complex or difficult duty or element in your work?
- m. What is your responsibility for developing methods and procedures?
- n. Are you responsible for recommending new policies or revisions of existing policies? If so, what are the subjects or matters involved?
- o. What contacts with people other than your subordinates, close co-workers and immediate superior are required of you by your work?

(Signature of employee)



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The entries on this form accurately describe the duties and responsibilities of the employee with no significant omissions except as noted below:

\_\_\_\_\_  
(Signature of Immediate Supervisor)

\_\_\_\_\_  
(Signature of Division or Department Head)

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FIGURE 8

A BASIC BRILL ANALYSIS REPORTING FORM

1. Title of Job :

4. Agency or Plant:

2. Alternate Titles:

3. Division or Department:

5. Date of Analysis:

6. Unit:

7. Job Statement: (Consider: What is done? Why it is done?  
How it is done?)

(Continue on separate blank sheet as necessary)

Prepared by Author



8. Job Relationships: (Consider: promotion from; promotion to; transfer to and from.)

- 
9. Equipment, Materials, or Supplies Used: (Consider: type, make and model of equipment, essential parts and operation in terms of worker's function.)
- 

---

SKILL REQUIREMENTS

---

10. Education and Required Knowledge: (Consider: Education required, vocational courses or other activities substitutable for the required education. State specifically why such education is required in terms of required knowledge.)

11. Experience and Required Knowledge: (Consider: Preemployment and on-the-job knowledge of equipment, materials, working procedures, techniques, and processes; new or previous experiences required; experience acceptable; and kind and extent of minimum training required. State specifically why such experience is required in terms of required knowledge.)

12. **Dexterity and Accuracy:** (Consider: Speed and degrees of precision, dexterity, accuracy, coordination, care, and deftness required for manipulation, operation, or processing of materials, instruments, machines, or gauges used.)
- 
13. **Responsibility:** (Consider: Supervision given and received and extent of such supervision; responsibility for procedures, equipment, materials and product; cooperation with others; instruction of others.)
- 
14. **Mental Applications:** (Consider: Presence and extent of initiative and ingenuity, adaptability, independent judgment, and mental alertness required.)
- 
15. **Physical Requirements:** (Consider: Requisite physical characteristics such as vision, hearing, appearance, age, sex, endurance, vocal quality, etc., and physical demands which relate to the degree and continuity of physical exertion, as lifting and pushing.)
- 
16. **Working Conditions:** (Consider: Accidents and health hazards present on the job, place of work, type of work, illumination atmosphere and surroundings, as noise, grease, or vibration.)
- 
17. **Comments:** (Consider: Personal opinions or observations of analyst; definition of unusual terms; further explanation of details not covered by items on this form.)



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APPENDIX B

## BIBLIOGRAPHY

BOOKS:

- Alford, L. J., and Farga, John E., (eds.) Production Hand-  
book, (New York: The Ronald Press Company, 1943)
- Baker, Otto, and Berkowitz, H. J., Guidance Plans and  
Methods, No. 8 of school Courses and Related Careers  
(Columbus, Ohio: The H. J. Keer Publishing Co., 1930)
- Falderston, C. Canby, Wage Setting Based on Job Analysis  
and Evaluation (New York: Industrial Relations Coun-  
selors, Inc., 1940)
- Farnet, Lamar, (Chairman) Position Classification in the  
Public Service, (Chicago: Civil Service Assembly of  
the United States and Canada, 1942)
- Fenge, Eugene J., Breaking the Skilled Labor Potable Neck,  
(New York: The Science Institute, 1942)
- Hingham, Walter Van Dyke, and Freys, Max, Procedures in  
Employment Paraphology, (New York: McGraw-Hill Book  
Company, 1926)
- Hoorfield, B. and Hoorfield, E., Problems in Personnel  
Management, (New York: E. W. Wilson Company, 1913)
- Davis, Ralph Carrier, Industrial Organization and Management,  
(New York and London: Harper and Brothers, 1940)
- Likenberry, D. H., (ed.), An Introduction to Guidance,  
(Columbus, Ohio: The H. J. Keer Publishing Co., 1930)
- Encyclopedia Britannica, Volume VIII and Volume XII,  
(Chicago, Illinois: Encyclopedia Britannica, 1945)
- Fitch, John A., Vocational Guidance in Action, (Published  
by the American Society of Social Workers--Columbia  
University Press, New York, 1935)
- Gilbert's Association, Inc., Industrial Relations Dept.,  
Current Utility Labor Agreements, (New York: Gilbert's  
Association, Inc., 1945)
- Hopwood, J. O., Salaries, Wages, and Labor Relations, (New  
York: The Ronald Press Company, 1937)
- Hall, Clark, Ability Testing, (Yonkers-on-Hudson, 1929) p. 236,  
Quoted in Rooster, E. E. and Kingsley, J. D., Public Per-  
sonnel Administration, New York and London: Harper and  
Brothers, 1936-1941.



BOOKS:

Mulverson, G. E., and McInerney, J. C., Personnel and Business Administration, New York: The Ronald Press Company, 1937

Munz, Charles, Measurement in Psychology, New York: Prentice Hall, Inc., 1938

Nytle, Charles W., Wage Incentives and Methods, New York: The Ronald Press Company, 1942

Posner, Wm. E., and Kingsley, J. D., Public Personnel Administration, New York and London: Harper and Brothers, 1938-41

Rees, Robert J., Personnel Management, New York: Alexander Hamilton Institute, Inc., 1941

Scott, Clothier, Mathewson and Spriegel, Personnel Management, New York and London: McGraw-Hill Book Co., 1941

Shefferman, N. W., Employment Methods, New York: The Ronald Press Company, 1927

Teed, Ordey, and Metcalf, H. C., Personnel Administration New York: McGraw-Hill Book Company, 1926

United States Employment Service, Dictionary of Occupational Titles, Part I, Washington, D. C., Government Printing Office, 1939

Viteles, Morris S., Vocational Psychology, Chapter XVII of Fields of Psychology, ed. by J. A. Hilford, New York: D. Van Nostrand Company, 1940

Watkins, G. S. and Dodd, F. A., The Management of Labor Relations, New York and London: McGraw-Hill Co., 1937

ARTICLES:

Baruch, Isser, "Basic Aspect of Position Classification", Readings in Public Personnel Administration, Washington, D. C. Civil Service Assembly of the United States and Canada, 1942, pp. 27-28

Berren, Harold, "Developing Promotional Opportunities" in Personnel, Vol. 18, No. 4, May, 1939, pp. 206-212

Locke, Horner, "Employee Ratings", in Personnel Journal, Vol. 21, No. 8, Feb., 1942, pp. 222-224

ARTICLES:

Lytle, Charles, W., "A Phase of Job Construction" in Personnel, Vol. 16, No. 4, May, 1940, pp. 122-127

Mann, E. T., "Employing Physically Handicapped" in Personnel Journal, Vol. 23, No. 4, Oct., 1944, pp. 130-134

Mitchell, John, "Duties of Today's Office Manager" in Office Organization and Personnel Problems, No. 94, New York, American Management Association, 1941, pp. 3-16

Personnel Research Federation, "Report from Three Companies" in Personnel Journal, Vol. 19, No. 7, Jan., 1941, pp. 222-226

Personnel Research Section, Adjutant General's Dept., United States Army "Personnel Research in the Army" in Personnel Journal, Vol. 21, No. 10, April, 1943, pp. 349-351

Stattin, Carroll, Vol. XXII, No. 7 of Occupation, New York: National Vocational Guidance Association, April, 1944, pp. 397-441

Wallace, E. F., "Job Analysis, Description and Classification" Personnel Journal, Vol. 22, No. 1, May, 1946, pp. 12-30

War Labor Board, General Order No. 21

Zerka, J. E., "Job Analysis: A Review and Bibliography" in Journal of Applied Psychology, Vol. 27, No. 2, June, 1943, pp. 249-267

CHAPTERS:

Weyden, Harold, "Employer-Employee Relations in the Office", From Attitudes and Emotional Problems of Office Employees, New York: American Management Association, 1935

Wegensen, Anne, "Skill", (Industrial Relations Section, California Institute of Technology, Pasadena, California, for Jan., 1946)

Hall, Frank, Controversial Issues in Salary Determination, Massachusetts: Massachusetts Institute of Technology, 1943

Meryiam, Lewis, Public Personnel Problems, Washington, D. C., Brookings Institute, 1933



PAMPHLETS:

National Industrial Conference Board, Inc., Job Evaluation, Studies in Personal Policy No. 25, New York: National Industrial Conference Board, Inc., 1940, p. 14

United Electric Radio and Machine Workers of America, The U. E. Guide to Wage Payment, Plans, Time Study, and Job Evaluation, No address. United Electric Radio and Machine Workers of America, 1943

APPENDUM:

ADDRESS:

Scappert, Joseph M., "The Foreman's Job in Our Time", New York: National Metal Trades Association, 1945

MANUALS:

United States Employment Service Manual, Part III, Job Families, Washington, D. C., U. S. Employment Service, June 30, 1943

United States Navy Manual, Bureau of Naval Personnel, Naval Occupational Analysis, Washington, D. C., 1949

REPORTS:

Report of the Proceedings of the Fifty-first Annual Convention of the American Federation of Labor, (Held at Vancouver, B. C., Canada, 1931) pp. 317-318





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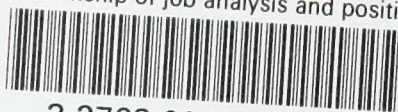
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